

CHRONIC COLITIS

ITS CAUSATION, DIAGNOSIS
AND TREATMENT

GEORGE HERSCHELL
AND
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Presented in honor of
Idella G. Craner, D. O.



COLLEGE OF OSTEOPATHIC PHYSICIANS
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BY

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PREFACE

DURING the past fifteen or twenty years there has been a marked increase in the prevalence of chronic colitis. It is a condition which now shares with appendicitis the most important position among those diseases which, in the absence of discovery of any unavoidable universal alteration in human conditions, we regard ourselves as obliged to accept as the inevitable concomitants of advancing civilisation.

That appendicitis has largely increased during the period under consideration there is not the least possible doubt. In the case of chronic colitis, however, although an absolute increase is, if not equally certain, at least highly probable, the apparently greatly increased incidence is partly due to an improved capability of recognition. In no sense can chronic colitis be called a "new disease." The literature of the period abounds with admirable evidence of its prevalence among the aristocracy during the reign of Louis XIV. Voltaire

himself was evidently a sufferer, whilst Molière caricatures in his most amusing way the fashion for purgation and intestinal irrigation in his day when colitis was evidently *en vogue*.

A perusal of the almost innumerable monographs that have appeared on this subject leads to the conclusion that a great deal of confusion which has arisen was in reality avoidable. Different writers have held a diversity of opinions as to the conditions which may fairly be represented by the term colitis: in many cases it is evident that entirely different things have been called by the same name, in other cases the same thing has been called by different names. We would plead, therefore, in extenuation of any unduly dogmatic attitude in our views as to the pathology and classification of chronic colitis, that it is better to give a clear statement of what we really do recognise than to rest content with the system of stringing together a non-committal description out of euphuistic phrases. So far as we are aware, this is the first English manual that has appeared on this subject. We have endeavoured to embody the best that has issued from the Continental authorities who have for so long made this disease

their special consideration. Whatever we have selected we have acknowledged, and our own contribution in criticism or recommendation of others' principles or of additional advice is the outcome of direct practical experience.

We make no excuse for the very elementary nature of much which appears, in fact we have purposely adopted this standpoint in order that the practitioner, who is of course *au fait* with the fundamental principles involved but who is denied the resources of a well-equipped laboratory, or who has not had an opportunity for special pathological training, may find a convenient work of reference in his diagnosis and treatment of one of the most chronic conditions it is possible for him to encounter.

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PART I
CAUSATION AND DIAGNOSIS

CHAPTER I

NATURE AND CONCEPT

THE evolution of our knowledge of chronic colitis may be said to have passed through three stages. The first of these was the recognition of the syndrome muco-membranous colitis, characterised by constipation, colic, and the passage of membranes. This was considered to be a distinct disease, and was described as such under different names and with varying ideas as to its pathology. The majority of the conditions which we now describe as chronic colitis were apparently, from the literature of the period, quite unknown. The best historical account of its literature is that given by Hemmeter:¹

“It is a disease which has been very thoroughly investigated and described by American clinicians long before it met with the critical consideration of foreign physicians. According to J. J. Woodward,² it was first described in America by Mason Good³ under the name of diarrhœa tubularis.

“For the earliest exact description of the dis-

¹ Hemmeter, *Diseases of the Intestines*, 1909, vol. i. p. 483. Rebman.

² Woodward, *Medical and Surgical Reports of the Civil War*, vol. ii.

³ Mason Good, *The Study of Medicine*, cl. 1, ord. 2, species 5, vol. i. Philadelphia, 1825.

ease we are indebted to Da Costa.¹ The most complete historical account of the literature relating to intestinal diseases associated with the discharge of membranes or tubes composed entirely of mucus is found in the classical work of J. J. Woodward,² in which we learn that the first to describe this affection was Fernelius.³ This author described two cases, one of which terminated fatally.

The first modern publication of importance in Germany on muco-membranous colitis was that of E. von Leyden,⁴ which was followed by numerous very thorough reports on the subject.

The consensus of opinion at this period was that muco-membranous colitis was of an inflammatory nature.

The second stage dates from 1884, when Nothnagel stated his opinion that a number of conditions, termed in practice enteritis membranacea, were most likely not of inflammatory origin, and for these he suggested the name colica mucosa. In a communication in 1895 he further developed the subject, and regarded colica mucosa as a distinct affection in which an abnormally large secretion of mucus took place from a sound mucous membrane. At the same time he drew attention

¹ Da Costa, *American Journal of the Medical Sciences*, Oct. 1871, p. 371.

² Woodward, *loc. cit.*, pp. 363-367.

³ Fernelius, *Patholog.*, lib. vi. cap. 9, p. 181. Paris, 1854.

⁴ *Deutsch. med. Wochenschrift.*, Bd. xvi. and xvii.

to the existence of other cases presenting the same syndrome, but in which there were undoubted anatomical, catarrhal, and inflammatory changes.

Nothnagel's division of muco-membranous colitis into two groups, one of purely nervous origin, the other with an anatomical basis, has provided the text for innumerable discussions. To read a representative selection of the articles that have been published solely on this question of classification is to be involved in an extraordinary complexity, in which it is evident that the same thing has been described by many different names and many different things by the same name. Nothnagel himself states that at the time of the appearance of the second edition of his book in 1904¹ three views were in general maintained:

1. That the affection was partly of nervous and partly of anatomical origin.

(Nothnagel, Ewald, Fleischer, Mannaberg, Rosenheim, Schuetz, Hemmeter, and others.)

2. That it was entirely and invariably a nervous hypersecretion of mucus in the intestine.

(Da Costa, Siredey, Vanni, Potain, Glenard, Einhorn, Westphalen, and others.)

3. That it was entirely and invariably of anatomical origin.

(Boas, Akerlund, Mathieu, and others.)

¹ Nothnagel, *Diseases of Intestines and Peritoneum*, p. 224.

The third stage represents opinion at the present day, when we have commenced to become rather sceptical as to the nervous origin of affections presenting such a definite character as mucous-membranous colitis.

The opinions of Nothnagel are practically accepted *in toto*, with this important exception: that whilst admitting the non-anatomical and non-inflammatory origin of some cases at any rate in the early stage, we are not prepared to concede that the explanation is to be found in the nervous system, and we are busily engaged in trying to find some alternative which does not make so many demands upon our credulity and which approximates more nearly to our modern conception of the ætiology of disease in general. At the present day there is a healthy scepticism which is not satisfied to accept without hesitation the conclusion that a condition otherwise inexplicable is a neurosis. Such an explanation may be regarded as a convenient subterfuge and no more. In the condition we are now considering, it is no slight strain on the imagination to understand how the nervous system can cause the production of a large amount of mucus and its concretion into sheets.

A deficiency of bile-salts has recently been advanced as a plausible explanation which will presently be detailed. Whether it will stand the test of further investigation remains to be seen.

Our present belief as to muco-membranous colitis may be enunciated as follows :

1. It may exist as an advanced stage in the evolution of chronic colitis (or constipation).

2. It may commence idiopathically with an anatomical basis and be due to infection or irritation, as in the case of other kinds of colitis.

3. It may commence idiopathically as a functional disorder of the secretion of mucus which at present we cannot explain and in some cases may eventually acquire an anatomical basis.

Apart from muco-membranous colitis the existence of chronic colitis has remained almost completely unrecognised. Nevertheless the majority of cases of colitis never reach the stage of muco-membranes, for which reason the early stages are generally overlooked in the absence of distinctive objective signs. As an inevitable consequence, all sorts of other conditions are diagnosed, the commonest being "atonic constipation," "neurasthenia," "ovarian irritation," and "chronic appendicitis."

A factor in the causation of erroneous diagnosis may be found in the opinion, still held by many of the older members of the profession, that colitis must always be accompanied by looseness of the bowels. Thus selecting an authoritative manual upon diseases of the stomach and intestine, published as recently as 1906, we find

that in the section on diseases of the intestine the conditions described are :

1. Acute catarrh.

2. Chronic catarrh. "The symptoms are looseness of the bowels . . . want of appetite, flatulent distension of the abdomen, and some degree of local pain or tenderness on palpation."

Not a word then is said of the commonest forms of chronic colitis accompanied by constipation.

We find it convenient to classify chronic colitis from the clinical standpoint as follows :

A. Simple chronic colitis without macroscopic mucus.

B. Chronic colitis with hypersecretion of mucus.

C. Muco-membranous colitis, exhibiting characteristically the syndrome of constipation, colic, and expulsion of membranes, but occasionally existing without colic.

It will be observed that in this classification we do not employ the term "mucous colic." This term has been held to include a great variety of different conditions, but in our opinion the only excuse for its use, one however which we entirely repudiate, is with reference to those cases of muco-membranous colitis which begin idiopathically without anatomical basis and yet display the features of constipation, colic, and the expulsion

of membranes. In this way the word "colitis" is avoided, a possible recommendation when directed towards conditions in which no inflammatory origin has as yet been traced. We cannot see that anything is to be gained by this artificial segregation into a separate class, of those cases the origin of which we are unable to discover. To refer to such cases as resting on a neurotic basis is merely to adopt a convenient evasion. These cases have no clinical distinction, and it is quite reasonable to assume that an extended knowledge will bring factors to light which will enable them to be grouped into line with all other cases of chronic colitis.

It may be as well to point out that we have not dealt with the condition of ulceration of the intestine except in so far as it relates definitely as a complication to chronic colitis. Ulcerative colitis we regard as a specific infective condition which is the province of the surgeon, and its consideration would be quite outside the scope of this work.

CHAPTER II

PATHOLOGY

THE opportunities of studying the pathology of chronic colitis are not numerous, because so few cases come to the post-mortem room in the early stages. Of recent date, our knowledge in this respect has been greatly enlarged by the use of the sigmoidoscope.

The same changes are seen to be present in the intestines which characterise the process of inflammation elsewhere. Mummery, who has done such good work upon diseases of the colon, recognises the following types of chronic colitis:¹

(a) Hypertrophic colitis. This is a hyperplastic condition with increase in the glandular elements, a proliferation of connective tissue, and a marked infiltration with round cells. Mummery describes the sigmoidoscopic condition as follows: "The mucous membrane is paler than normal and considerably swollen, due to submucous œdema. The mucosa tends to lie in folds or concentric rings, and to prolapse into the lumen in a characteristic manner. This condition is

¹ Mummery, *Diseases of the Colon*, p. 137. London, 1910.

associated with excessive secretion of a thick glairy mucus which can be seen sticking to the bowel wall in long bridges or loops."

(b) Granular colitis. This is due to inflammation of the follicles in the mucosa. Each follicle is swollen and projects above the general surface.

(c) Chronic catarrhal colitis. There is no particular feature to differentiate this form of inflammation. Here the whole visible mucous membrane can be seen to have lost its normal glistening appearance, and to be much redder than the normal mucosa. In a well-marked case the appearance is as if the surface had been rubbed with sandpaper.

In addition to these forms described by Mummery, there is an atrophic form which is a late development of the ordinary catarrhal colitis, in which the glands have undergone atrophy and the mucosa and the sub-mucosa have become markedly thinner.

The atrophy of the glands is probably due to pressure from the surrounding hyperplastic structures.

The most interesting problem in the pathology of chronic colitis is the causation of the mucus and muco-membranes. The subject naturally divides itself into two parts: the cause of the secretion of the mucus, and the reason why it presents itself in the form of muco-membranes.

Authorities are unanimous that the normal stools should contain no mucus. As Mathieu¹ points out, this statement is a paradox. Microscopic anatomy has shown us that the intestine is paved with cells which produce mucus. What becomes, therefore, of the mucus which they produce?

In the material coming from a fistula into the small intestine there may be observed small particles of mucus measuring some millimetres in diameter, coloured yellow or green by the biliary pigment. These may be observed in a fistula situated as far down as the end of the small intestine. But when the cæcum is reached all the mucus disappears, solution having occurred, probably as the direct result of the chemical processes in the large intestine. That the mucus is dissolved can be demonstrated by making an aqueous extract of the fæces, from which it can be precipitated with acetic acid.

The immediate effect of variations in the amount of mucus is to alter the consistency of the fæces, which in certain cases may even acquire a gelatinous appearance. In fact, the experienced observer can calculate roughly from the appearance of the fæces how much dissolved mucus is present.

It may be taken as a rule, with practically

¹ Mathieu, *Pathologie Gastro-intestinale*, p. 381.

no exception, that whenever mucus is present and demonstrable as such in liquid, flocculent, or in membrane form, it is always an indication of a pathological condition of the digestive tract. For in order to escape solution, the mucus must in the first place have been secreted in much larger amount than normal, and in order to be precipitated in the form of membranes, a ferment is necessary which is formed especially when the mucous membrane is inflamed.

Such a ferment was identified by Roger,¹ who gave to it the name mucinase. Its existence has been confirmed by Riva² and Tremolières, who found it in the blood and fæces of patients suffering from well-marked entero-colitis.

It was subsequently discovered that the coagulating action of mucinase was inhibited by bile-salts: when it was next ascertained that in most cases of chronic colitis there was hyposecretion of bile, the inference was obvious that one factor at least in the production of mucomembranes in patients with chronic colitis is the loss of the inhibitory action of the bile upon the mucinase present in the blood and fæces.

The cause in the intestines of the mucinase in excess has not yet been satisfactorily explained.

¹ H. Roger, "La Coagulation de la Mucine," *Soc. de Biologie*, Nov. 11, 1905.

² "Présence de la Mucinase dans le Sang," *Comptes Rendus. Soc. de Biologie*, Ap. 7, 1906, p. 690.

It may quite possibly be due to the irritation in the intestine and be an expression of an inflamed mucosa. At any rate, it proves conclusively that a number of cases in which a purely neurotic origin was assumed simply because actual inflammation was absent really owed their origin to deficiency of bile. The hypothesis is substantiated by the result of treatment based upon it.

Assuming the presence of an excess of coagulated mucus in the intestine and a neurotic individual whose intestines will react to comparatively slight stimuli, we have all the elements for an attack of muco-membranous colitis.

It is probable that most cases of muco-membranous colitis commencing in this manner eventually develop a real inflammatory process.

It is easier to explain the production of mucus in other forms of colitis where definite irritating factors are at work as in the following :

1. Injury to the large intestine.

(a) Constipation. In this connection the scybalae act as mechanical irritants.

(b) Injections of glycerin.

(c) Abuse of intestinal lavage.

Mathieu¹ says that a way to prolong indefinitely a condition of chronic colitis is to give a daily lavage of the intestine. In support of this contention we may add that our experience has

¹ *Op. cit.*, p. 385.

convinced us that many cases of chronic colitis owe their origin and perpetuation to treatment at sulphur spas, imperfectly supervised or undertaken without special advice.

2. Infections.

- (a) Direct experimental introduction of colon bacilli, staphylococci, and streptococci into the intestine have tended to show that all infections of the intestine commence with looseness of stools accompanied by excess of mucus.
- (b) The elimination of certain poisons such as mercury.

CHAPTER III

CAUSATION

THE chief causes of chronic colitis as met with in daily practice may be grouped as follows:

Predisposing Causes.

To a certain extent most of the conditions which must be enumerated as causes of colitis are predisposing factors. But if we accept as our criterion to be included in this category only those factors which cannot be shown to be of direct influence, the list will not be very long. Patients not infrequently attribute the onset of their chronic colitis to some such ailment as influenza or measles, which might be regarded merely as determining a condition of lower vitality or of causing a modification of the intestinal flora and diminishing the resistance of the intestine to the injurious influence of anærobic bacteria. Daniel ¹ says "it is quite justifiable to assume that such ill-understood or forgotten infantile lesions (repeated or prolonged infantile diarrhoea) may be the basis of future colitis of the mucous variety."

Other ailments which may also be regarded as predisposing factors are scarlet fever, typhoid fever,

¹ *The Proctologist*, March 1912.

and in fact any of the acute exanthemata. It is reasonable to ask why scarlet fever, which causes nephritis, should not also cause colitis.

Chronic Constipation.

(a) Directly.

(b) As a consequence of improper means adopted for its relief.

Infection.

(a) From food ingested.

(b) From the mouth.

(c) From the nasal cavities.

(d) From a diseased appendix.

(e) Local infection from an ulcer.

Mechanical Irritation.

(a) Ptoses, (b) kinks, (c) strictures, (d) adhesions, (e) neoplasm.

Intestinal Parasites (which act both by irritation and infection).

Excretion of Irritating Material through the intestinal mucosa.

Through the influence of the nervous system.

These will now be considered in detail.

CHRONIC CONSTIPATION

The rôle of constipation in the production of chronic colitis can hardly be over-estimated; and the relationship between the two affections must

be thoroughly grasped before much progress can be made in the study of the disease.

Constipation and chronic colitis may bear a reciprocal relationship to each other in the following sense :

1. Constipation and attempts at its cure may be the direct cause of a chronic colitis, which then appears as a distinct stage in the evolution of the constipation.

2. Constipation may arise as a symptom in a colitis which has had a different original cause. When arising in this way it will tend to perpetuate the affection and render it difficult to cure.

There is an unfortunate tendency for the public to regard themselves as legitimately entitled to be their own physician for "such a simple complaint as constipation," and in this way they are encouraged by the attractive advertisements of aperients which appear in the pages not only of the lay but also of the medical press. The result in most cases is that a constipation, which at the beginning could have been rapidly and permanently cured by appropriate means, becomes confirmed and perpetuated by the indiscriminate administration of purgatives, and eventually drifts into the stage of chronic colitis.

The temptation to make use of laxatives to secure a daily action of the bowels is very great, as it is much easier to take a pill or daily draught

than to give up the time and spend the money necessary to cure the constipation by undergoing a proper course of physical treatment, or to take the trouble to follow a diet which is often irksome and generally involves a certain amount of disturbance of household routine.

The abuse of purgatives is in consequence extremely common; the injurious effects which result from such abuse are equally common. As a matter of fact, patients rarely come to be cured of their constipation until by years of persistent pill taking they have so damaged their intestines that what at first would have been an easy task is now one of great difficulty, and if the functions of the bowels are to be restored at all it will be only after prolonged treatment. So ignorant are patients of the damage which they are doing to themselves and of the essential difference between a stool occurring naturally and one produced by physic, that it frequently happens that when you ask whether the bowels are open regularly, the reply is, "Yes, doctor, I always keep them so," and they have not the faintest idea that they are damaging themselves and that a time will come when that dose will cease to produce the customary effect. They are under the delusion that all is well so long as the bowels are by some means or other open every day.

The first stage of ordinary chronic constipation

has been termed the atonic stage, although in the light of modern science the defect is explained as due more probably to some deficiency of the peristaltic hormone of the intestine than to any actual weakness of the intestinal muscularis itself.

Whatever the explanation, after a period longer or shorter devoted to irritation of the intestine by purgatives or douches, a chronic colitis is set up which further complicates the case. Unless this is recognised and properly treated and the abuse of purgatives promptly stopped, the next stage is eventually reached in which the continual irritation to which the bowel has been subjected produces a hypertonic condition of the muscularis, marked by spasm of the colon, which may be felt as a hard rod beneath the examining fingers. This, the spastic stage of constipation, was described by Fleiner as a distinct variety of constipation under the name spastic constipation. Later still if the disease is not arrested, the colitis becomes complicated with the passage of muco-membranes, and eventually in some cases displays the classical syndrome of muco-membranous colitis.

Another class of individuals, especially those addicted to so-called advanced thought, who are of fanatical unbending vegetarian principles or who impose upon themselves even more restricted dietary systems and in nearly all cases evince a horror of drugs in any form, succeed in doing them-

selves just as much harm by means of the special food which they take in attempting to relieve their constipation by what they imagine are natural means. To this end they load their digestive tract with coarse food especially selected on account of its large residues. By this means a catarrhal condition is caused, with the natural accompaniment of loose stools, but the only result has been the substitution of one diseased condition for another: deliberately, as it were, a chronic colitis has been set up by the production of an intestinal indigestion. In addition to these two methods in which constipation indirectly produces colitis by the efforts made for its relief, there is a third, the stagnation of fæcal material in the colon. This causes irritation, mechanically by the presence of scybalæ, chemically by the irritating materials which are produced, and bacteriologically by the toxins formed by the abnormal flora of the intestine.

To recapitulate, constipation may produce colitis—

1. By the abuse of purgatives.
2. By excess of coarse food taken for its relief.
3. Through the irritation of retained fæcal matter.
4. By the abuse of enemata.

This latter at first sounds a paradox. Do not patients go to Harrogate, Llandrindod Wells,

Plombières, and Châtel Guyon for the cure of their colitis? Nevertheless, we are convinced that many cases of chronic colitis owe their origin to a course of high colonic douchings with sulphur water. At many spas, as soon as a case of constipation arrives and a diagnosis of fæcal retention is made, the patient is as a matter of routine subjected to a course of colonic douchings administered on a rule of thumb principle by persons without any medical qualification.

In many cases this procedure does no harm. In those who are on the verge of the colitic stage the added irritation promptly brings on colitis. There is, however, nothing to be said against the rational use of the waters of Plombières and Châtel Guyon, which are undoubtedly useful in the treatment of chronic colitis. But we have yet to see a case of chronic colitis permanently cured by the use of sulphur water. Most of the cases, although apparently benefited for a time, are eventually made much worse.

INFECTION

Next in order of importance we encounter a group of causes which should be studied in conjunction, as they are mutually reactive.

Infection may occur—

1. From the food.
2. From the mouth.

3. From the post nasal space.
4. From a diseased appendix.
5. From local ulceration.

Infection from Food.—The mere fact of the patient's taking an excess of animal food will usually result in intestinal putrefaction, and we are personally convinced that one of the chief causes of the prevalence of auto-intoxication at the present day is the large excess of animal food over the real requirements of the body habitually indulged in by the majority of mankind.

This supposition rests upon an experimental basis, since it has been demonstrated that the number of anaërobes is relatively large and the number of colon bacilli (aërobes) relatively small in the intestines of the carnivora. In these investigations it was found that a large proportion of the abnormal organisms were of the type of the *bacillus capsulatus*. In herbivora, the contrary condition of things prevails, the dominant organisms being aërobic.

If meat which is perfectly fresh will tend to increase intestinal putrefaction, how much more likely is this the case with meat which is not above suspicion? In these days of cold storage and restaurant and hotel feeding, we have no means of knowing that the bird which is put before us was not placed in the cold chamber several months ago when perhaps just on the

verge of decomposition, and may contain toxins not only ready made but which, since they are in an early stage of putrefaction, will only need the favourable conditions which will be found in the intestines for the process to continue.

Fish, again, is an article of food which we consume at considerable risk. It is a well-known fact that fish commences to decompose from the moment it is taken out of the water. It is almost impossible to obtain fish which has been caught less than twenty-four hours previously, and this is even the case at the very seaside places where it is captured. Most of it has to be sent up to London and other large cities to dealers who have contracted for the whole catch, afterwards to return where it was caught, to be sold for local consumption.

Infection from the Mouth.—It is probably no exaggeration to assert that the commonest factor which determines whether a given case of atonic constipation will or will not pass into the stage in which it is complicated by colitis is the condition of the mouth. Quite apart from the efficiency of the teeth as a masticating machine, the presence of centres of pus infection from which millions of virulent organisms are swallowed with each mouthful of food must be a constant menace to the integrity of function of the gastro-intestinal tract. The chief protection which the human

body possesses against infection of the alimentary tract is, as Boas first pointed out, supposed to reside in the secretion of gastric juice, which has the power when it is normal of inhibiting the growth of micro-organisms. But it would seem that this protective power of the gastric juice has been much overrated, for it must be remembered that it is secreted only periodically during the digestive period; at all other times the stomach is defenceless against the germs which in a case of oral sepsis are always present ready to be swallowed with the saliva.

Furthermore, there are many forms of indigestion in which the gastric juice is altered in composition and is devoid of that amount of free hydrochloric acid upon which depends its antibacillary powers. It is much more probable that the chief protection is the resisting power of the organism, since it can be raised by the injection of vaccines by which colitis can be cured.

Colyer,¹ who has done a great deal of useful work upon the subject, thinks that although the organisms themselves acting upon the normal mucosa of the stomach may be able to give rise to a septic gastritis, "it is probable that the chain of events is usually as follows: the food, imperfectly masticated and incorporated with infected

¹ Colyer, *Dental Disease in Relation to General Medicine*, p. 135. London, 1911.

saliva, undergoes excessive fermentation, with the result that sooner or later a catarrhal inflammation is started. The sticky exudation from the inflammation forms an excellent nidus upon which organisms can grow and directly affect the gastric walls. . . . The sepsis from the stomach escapes through the pyloric opening and directly infects the bowel. Thus we find associated with septic gastritis, symptoms of intestinal trouble such as constipation, diarrhœa, and possibly some cases of mucous colitis."

Infection from the Post Nasal Space.—Post nasal catarrh is an extremely common infection at the present day, especially among those who dwell in cities and large towns. The inhalation of the septic dust from the roadways, and the habit of smoking, combine to set up an irritable condition which is accompanied by the secretion of a varying amount of mucus teeming with virulent organisms. This is constantly swallowed both by day and night, producing almost precisely the same effects as the organisms in the case of pyorrhœa.

It is probably during the night that most of the infection from post nasal catarrh takes place. The stomach at that time contains no hydrochloric acid with which to defend itself, and the patient is continually if unconsciously swallowing quantities of mucus containing organisms, the

most common of which is the bacillus of Friedlander.

To some authorities, oral or nasal sepsis is of all forms of infection the most virulent in the production of severe degrees of colitis. Such a view may be expressed in a quotation from Peter Daniel,¹ who after reviewing the various contributing and determining causes of colitis says: "Lastly I state dogmatically that in the case of primary (mucous) colitis,² if the patients are sufferers from oral or naso-respiratory sepsis they almost all develop into the ulcerative or necrotic varieties as a direct consequence of swallowing strepto- and staphylococci, otherwise they remain cases of primary mucous colitis unless a blood infection of the colon occurs."

Infection from a Diseased Appendix.—It is surprising that the Continental and English schools hold entirely different views upon the relation between colitis and appendicitis. Although many of the French writers are prepared to concede that both may arise from the same cause—a favourite explanation being some feature of modern civilised life, such as the extended use of frozen and preserved meats—yet the relationship between the two of cause and effect is generally doubted and often entirely denied. Thus de Langenhagen

¹ *Loc. cit.*

² By this term Daniel would appear to subtend what we describe as "chronic colitis."

found in 1200 cases of colitis only 16 with a diseased appendix, which was removed, and after appendicectomy 14 out of the 16 cases were still troubled with symptoms of colitis.

Caley¹ quotes Bottentuit of Plombières as publishing 22 cases of colitis under his care in which appendicectomy had not materially relieved symptoms. On the whole, the French authorities regard any association between the two conditions as far from frequent, and whilst admitting the possibility of direct propagation of infection from one to the other, think it extremely rare. They cannot subscribe to the belief that appendicitis is a terminal sequel of chronic colitis, nor do they think that sufficient evidence has been advanced that appendicitis is more frequent in patients with chronic intestinal troubles than in others.

The diagnosis often made of appendicular pain (colic) they consider to be most frequently caecal attacks of muco-membranous colitis.

On the other hand, the views of English surgeons based upon actual personal experiences are entirely different. Lockwood² says categorically: "There can be no doubt whatever but that appendicitis can cause colitis. Every one who has done many operations for the removal of the vermiform appendix has seen cases in which

¹ Caley, *British Medical Journal*, June 9, 1906.

² Lockwood, *British Medical Journal*, 1905, vol. i. p. 467.

the end of the ilium, the cæcum, and the right colon were obviously inflamed. In addition, there is tenderness along the course of the right colon and rigidity of the abdominal wall, and evidence has been forthcoming to show that the inflammation seen upon the outside of the colon must also have involved the mucous coat, because mucus or mucus mingled with blood is seen in the evacuations;" and Lockwood cites cases in which appendicectomy cleared up the colitis.

Lockwood¹ states that appendicitis may cause colitis either "directly by extension, owing to proximity and identity of blood supply, or indirectly by bringing about coprostasis."

He concludes that "cases in which the appendicitis was the undoubted cause of colitis are a highly satisfactory class because of the happy effects of operation. But it is otherwise with colitis which begins in the large intestine and spreads to the appendix. As one might suppose, by the removal of the appendix alone, it would be rash to promise a favourable result."

Mummery² is of the same opinion. The evidence, he says, is very strong that appendicitis can cause colitis, although there is clearly the question to be answered whether the colitis is not the first

¹ Lockwood, *Appendicitis: its Pathology and Surgery*, p. 255. London, 1906.

² Mummery, *Lancet*, June 15, 1907.

to be produced, appendicitis following secondarily, or whether both may not arise from the same cause, *e.g.* improper diet and constipation. He considers that colitis may result from a diseased appendix in the following ways:

1. By inflammation spreading from a diseased appendix to the cæcum and colon by direct continuity.

2. By the formation of adhesions which, by constricting the lumen of the bowel, set up local inflammation which afterwards spreads.

3. By the discharge of septic material into the bowel. In this connection, Mummery points out how erroneous it is to regard the large intestine as normally a septic cavity. Chronic appendicitis, he adds, can cause colitis in this way just as carious teeth can cause gastritis.

On the whole, we feel that it is difficult to see why objection should be taken to a causal relationship between appendicitis and colitis. It is so reasonable to conclude that the continual outpouring of septic material from a diseased appendix can hardly fail eventually to infect the bowel, and conversely. Nor is it asking very much to believe that by direct continuity appendicitis may result from a chronically inflamed colon, subsiding or not (as the case may be), when the latter becomes cured.

It is, to say the least, not at all improbable

that many cases which in the past were diagnosed as appendicitis and operated upon without any material relief to the symptoms were cases of chronic colitis. They did not recover because the removal of the appendix *per se* could not be expected to cure a chronic colitis which had not been diagnosed and for which appropriate treatment had not been undertaken.

Infection from Local Ulceration.—Not only can chronic colitis be complicated by ulceration, but an ulcer, however produced (typhoid, tubercle, stercoral), is necessarily accompanied by some colitis in its immediate neighbourhood, and may eventually produce a far-reaching infection of the intestinal mucosa.

MECHANICAL IRRITATION

It is found occasionally that ptoses, kinks, strictures, adhesions, neoplasms, and other such sources of chronic mechanical irritation may set up chronic colitis. One of the first to recognise this association was Glenard, who, evidently having in his mind only the syndrome known as mucomembranous colic, evolved the following far-fetched explanation. He thought that hepatosis would lead to altered vascular tension in the liver which, by diminishing the secretion from the mucous membrane of the intestine, would favour the pre-

cipitation of mucus by acids in the gut. Mathieu asserts that hypersecretion of mucus occurs in patients of a neuro-arthritic type who suffer from enteroptosis. De Langenhagen believes that enteroptosis is present in all serious cases of chronic colitis, but is uncertain which is the cause and which the result. It seems easier, he concludes, to presume enteroptosis as the consequence, and to imagine that through some primitive disturbance of the nervous system the sequence—intestinal atony, then colitis, then enteroptosis, takes place.

As a matter of fact, enteroptosis may indirectly produce chronic colitis as a consequence of the constipation resulting from it, and one of us has seen a case of localised chronic colitis apparently produced by an extremely movable kidney.

Here again we use the word “apparently,” because the interpretation that chronic colitis may be the cause and not the effect of nephroptosis has to be considered. Liddell,¹ in a paper on colitis and movable kidney, states his opinion that the toxins in colitis reduce the perinephric fat and that nephroptosis in consequence results.

There can be no doubt also that a great many movable kidneys have been stitched up with the expectation or at least the hope that this treatment would prove a cure for all the symptoms of

¹ Liddell, *Lancet*, 1912, p. 817.

which the patient complains, but with complete failure. It is easy to understand how very satisfactory it is to find some plausible objective abnormality and to utilise this as the *causa causans*, when often it is only after a laborious investigation that a suspicion of colitis can be raised, whilst the much-abused kidney may be only coincidental or, as observed above, the effect of the colitis.

The pressure upon the intestine of an abdominal or pelvic tumour has often been the cause of a chronic colitis. The enormous amount of mucus which is caused to be secreted through the pressure of a rapidly increasing abscess and expelled through the anus may be taken as an example of what pressure upon the gut can cause, although strictly it does not come into the category we are considering. As a matter of interest, one of us was called in to explain such a mucous discharge, in this instance due to the pressure of a pelvic abscess secondary to a leaking gastric ulcer which had been overlooked. Tuttle has recorded six cases of abdominal aneurism in which there was well-marked and intractable mucous colitis.

Anything which will narrow or constrict the lumen of the intestine can cause chronic colitis, local irritation resulting from the slow passage and consequent putrefaction of the stools or mechanically from their hardness. We continually

find localised colitis in cases in which the intestine is bound down by adhesions or has become constricted from any cause. In cases in which the calibre of the intestine is narrowed, there is a tendency for dilatation and bulging to take place immediately above the stricture and fæcal matter to be retained. The irritation thereby induced sets up a chronic colitis characterised by attacks of spurious diarrhoea by which nature attempts to remove the offending material.

The following list recorded by Mummery¹ gives an idea of the relative frequency of the various mechanical causes of colitis: Out of 66 cases of chronic colitis, 14 were due to adhesions and pericolitis causing kinking and obstruction, 5 to enteroptosis of the colon, 5 to chronic appendicitis, 2 to inflammation or displacement of the uterus or its appendages, 2 to previous operations upon the abdomen involving the colon, 7 to cancer, and 1 to fibrous stricture. In 30 cases the colitis was not due to a local lesion.

We find then of a given series of cases more than half secondary to a definite local lesion. Of course this particular series is far too small to settle numerically the relative frequency of the several conditions, but it serves as a useful lesson to point out that no case of chronic colitis should be assumed to be of a primary nature before a most

¹ Mummery, *Diseases of the Colon*, p. 134. London, 1910.

thorough examination, more especially with the sigmoidoscope, has been undertaken. For this reason, recorded cases and opinions deduced therefrom prior to or independently of the routine use of the sigmoidoscope are practically without scientific value.

INTESTINAL PARASITES

These cause colitis not only because they secrete substances which are irritating to the human intestinal tract but because their own alimentary canals often contain virulent micro-organisms. We recently had the opportunity of observing a case of chronic colitis of long standing and obstinately resistant to treatment in which the stools upon repeated examination were found to contain ova of the *ascaris lumbricoides*. Upon treatment with *santonin*, this long standing chronic colitis disappeared promptly and permanently.

EXCRETION OF IRRITATING MATERIAL THROUGH THE INTESTINAL MUCOSA

It may, we think, be taken as proved that uric acid is under certain conditions eliminated by way of the intestinal mucosa. Hayem records a case in which uratic incrustations were found upon

the villi in the large intestine. Dieulafoy and Mathieu both regard intestinal lithiasis as a manifestation of the gouty diathesis. Hemmeter¹ found large quantities of uric acid in the stools of two patients suffering from membranous colitis both during the attacks and in the intervals, and suggests that "while the uric acid itself may not be the causative factor, it can logically be regarded as the exponent of a large number of toxins and injurious substances that seek their way out through the intestinal mucous membrane in disturbances of metabolism and renal insufficiency."

THROUGH THE INFLUENCE OF THE NERVOUS SYSTEM

We have already alluded to the advance in the science of medicine, which has passed the stage of remaining satisfied with the mere labelling of a diseased condition or its relegation to a "neurotic" basis. It is not so very long since a neurotic origin was claimed for every affection in which no gross anatomical causation could be ascertained occurring in a neurasthenic or hysterical individual. As knowledge extends, the number of diseases produced "reflexly" gradually diminishes. The "secretion neurosis," until quite recently accepted

¹ Hemmeter, *Diseases of the Intestines*, vol. i. p. 490. London and New York, 1901.

as the causation of at least some (a few observers said all) cases of muco-membranous colitis, has been superseded by the much more satisfactory explanation that it is a matter of chemistry strictly comparable to many similar processes.

CHAPTER IV

SYMPTOMS OF CHRONIC COLITIS

THE symptoms accompanying chronic colitis may be divided into the following :

Abnormalities in the stools and in the movements of the bowels.

Local discomfort and pain.

General symptoms produced either reflexly or by auto-intoxication.

MOVEMENTS OF THE BOWELS

Whilst in acute colitis diarrhœa is the rule, in the chronic affection constipation is more usually encountered. For the sake of clearness it will be as well to tabulate the conditions which may be met with.

1. The movements of the bowels may be regular ; the stools, however, present the characteristics of chronic colitis. They may be pappy or semi-solid from the admixture of mucus, they may contain undigested food, they may possess an abnormally foetid odour, and they may present the other characteristic abnormalities given in the chapter on Diagnosis, p. 79, *et seq.* Finally,

there may be, in spite of apparent regularity, chronic fæcal retention.

2. The bowels may be constipated. This may be continuous, or there may be regular alternations of constipation and diarrhœa, or there may be intercurrent attacks of diarrhœa not occurring regularly.

3. There may be chronic diarrhœa.

4. The passage of muco-membranes preceded by colic may occur.

The cases in which there is a daily movement of the bowels belong to quite a small class, and often exhibit strange abnormalities. For instance, there may be a movement of the bowels during the night, or there may be one early in the morning on waking, and perhaps another one after breakfast. The motions passed, however, are characteristic, and at once point out to the trained eye the presence of chronic colitis.

The most important feature of the stools which indicates chronic colitis is the presence of mucus. Cancer and ulceration of the bowel *per se* never lead to the production of mucus, any mucus which is present in such conditions is due to the accompanying catarrh. Mucus is never present in any quantity in chronic constipation uncomplicated with colitis, although occasionally a hard lump of fæces becomes covered with the layer of shining varnish-like material described by

Nothnagel.¹ The same author also points out that in certain cases of severe catarrh of the rectum and sigmoid, in which a large amount of mucus was demonstrated at the autopsy, none was present in the fæces, as the small-calibred stools were unable to detach it from its adherence to the walls of the gut. We may mention that this condition would have at once been discovered by our more modern methods of investigation, such as the sigmoidoscope, or even by diagnostic lavage. The subject of mucus is further discussed on pp. 58, 89, and 266.

Chronic fæcal retention is a condition which is frequently present in these cases, and is overlooked because the bowels are moved at regular, even at daily, intervals; but as the average amount of fæces discharged from the body is smaller than the amount formed, some of it is retained, and to the retained mass, day by day, regular additions are made. The result in some cases is the formation of fæcal masses in the intestine, and this may occur even in spite of diarrhœa, a condition which in such cases has been termed by Fleiner² "constipatio paradoxa." In our experience these cases have usually occurred in patients in whom the sigmoid was dilated and the rectum had lost its intolerance for fæces (as

¹ Nothnagel, *Diseases of Intestines and Peritoneum*, p. 188, 1904.

² Fleiner, *Modern Clinical Medicine*, p. 672. Appleton, 1907.

we mention elsewhere), so that the amount expelled by the daily action of the bowels being immediately replaced by fresh material, the faecal mass in the lower bowel never underwent any real diminution, in fact from the inevitable progress of the dilatation it would hold more from day to day and the amount of retained faeces would increase. Fleiner does not give us sufficient details to enable us to ascertain whether the cases to which he alludes were of this category, but in pre-sigmoidoscopic days the physician did not apparently attempt to diagnose in what part of the bowel any abnormality occurred and remained quite content with his perspicuity in discovering the abnormality at all.

In other cases when the faecal retention reaches a certain point, the irritation of the retained material sets up diarrhoea and thus affords one explanation for the cases in which there is regular alternation of constipation and diarrhoea.

The cases in which the bowels are persistently constipated form a large group, and include those cases occurring in the evolution of atonic constipation which have reached the spastic stage. Earlier, however, before the spastic stage has developed, the condition of alternating constipation and diarrhoea occurring at variable intervals is far more likely to present itself. Once the spastic stage has been reached, there usually

occurs persistent constipation which is very difficult to relieve or attacks of muco-membranous colic. It is probable that in most of the cases in which constipation and diarrhœa alternate there is more or less fæcal retention, and the retained fæces set up increased peristalsis either through the mechanical stimulation of their bulk or by their decomposition with the production of irritating substances.

The cases with intercurrent attacks of diarrhœa at regular intervals, termed by the French "Crises," are exceedingly common and are due to the gradual accumulation in the intestines not of actual retained fæces but of the toxins produced by their decomposition.

In the next group of cases in which the bowels are loose the patient will pass regularly several loose stools a day, and this condition may persist for months. It is practically always due to implication of the small intestine in the morbid process. The products of the intestinal catarrh in combination with the products of fermentation of the food residues which have undergone imperfect digestion in the small intestine, irritate the colon, already abnormally irritable from its colitis, and cause increased peristalsis and consequently diarrhœa.

LOCAL DISCOMFORT AND PAIN

Acute pain is generally absent except in the periodical attacks (acute exacerbations) which may occur. Most patients, however, complain of a persistent general discomfort of the abdomen which sometimes amounts to a widespread diffuse soreness. This discomfort, although frequently spontaneous, may in other cases come on either after food or after the bowels have been opened. The discomfort which follows the action of the bowels is, however, frequently of a more intense nature and approaches in character actual pain. It is usually felt in the region of the cæcum and of the sigmoid. On the other hand, the pain is often very severe in the form of colitis termed muco-membranous colic.

One of the most annoying sensations experienced by a patient is due to peristaltic unrest associated with an hyperæsthetic condition of the abdominal nerves. Such an hyperæsthetic condition is responsible for many disagreeable sensations even in the absence of any increase in the peristalsis of the intestines; the patient is in fact conscious of the ordinary normal processes which are going on in his abdomen, and in typical cases he is actually able to feel the food passing from the stomach through the pylorus, and the normal peristaltic

movements of the colon are translated into various disagreeable sensations.

As these natural movements are increased after the ingestion of food and before and after a passage of the bowel, an explanation why the patient suffers most at these times is at once to hand. The formation in the intestines of the irritating products of fermentation and putrefaction increases the peristalsis of the unnaturally irritable intestine with a concomitant exacerbation in the patient's sensations. In fact, a very characteristic system is the occurrence of pain referred to the umbilicus immediately after food. On account of this time-relation to food this pain is often considered to be of gastric origin. In reality, as explained above, it is due to peristalsis in the tender colon excited by the entrance of food into the stomach.

In the muco-membranous type the pain is often very severe, and resembles fairly closely the pain in other types of colic. Appearing at first in the segment of colon behind the spastic area, it may travel along, accompanying the passage through the intestine of the mass of muco-membranes and ceasing when they are finally expelled. It may radiate to the back, hips, and thighs, and frequently causes intense suffering.

In practice, one is constantly meeting cases of chronic colitis in which the presence of pain and tenderness has been responsible for a wrong diag-

nosis. We have seen chronic colitis with localised pain in the right hypochondrium diagnosed as cholecystitis, in the epigastrium as ulcer of the stomach, and over the cæcum as appendicitis.

GENERAL SYMPTOMS

The general symptoms met with in chronic colitis are motor, sensory, mental, and visceral.

Motor Symptoms.—The essential cause of all the motor symptoms is the occurrence of muscular fatigue much more early than normal. The muscular power of the patient is therefore lessened in the aggregate without there being any true paralysis. At the commencement of muscular exertion his power may be nearly up to normal, but it quickly declines. In consequence, the patient complains of muscular fatigue and pains in different parts of the body, coming on shortly after exercise has been commenced. A phenomenon which is constantly present is a jerking of groups of fibres in the muscles. This is an experience familiar to all of us in the twittering of fibres in the orbicularis palpebrarum, popularly called “live blood.” In chronic colitis this condition is sometimes exaggerated and may appear in any of the muscles of the body, even the largest, causing considerable annoyance.

Sensory Symptoms.—The patient never feels

quite well and always has some vague or abnormal sensation, *e.g.* of pain in the head, tingling, twitching, or of crawling sensations, of heat, of burning, or of cold, sensation of a band round the head or arm or leg, of weight in a foot or leg, of drawing or contraction round the mouth. Back-ache may be present, and hyperæsthetic areas, or spots upon the body especially sensitive to pressure, may be definable. Conversely, numbness may be present over defined areas. Fatigue symptoms may occur in the eye, causing dimness of sight or ocular distress after working for a time, or there may be sudden blurring of the sight. Any of these may make the patient's life a perfect misery and distract his attention and that of his medical attendant away from the underlying condition.

Mental Symptoms.—In the first place there is a lessened power for mental work. This is because the brain is easily fatigued in the same manner as the muscles. For the same reason there is loss of the power of mental concentration, since fatigue occurs unconsciously and the patient is unable to keep his attention fixed upon one point for any length of time. Consequently memory is defective, as the integrity of this function depends entirely upon the depth of the impression, will power is lessened, and the patient becomes undecided, weak, and vacillating. A symptom which sometimes causes a great deal of distress is

an undefined sense of misery in the head, a sensation which it is impossible to describe in more definite terms. The patient may be feeling quite well when he will suddenly be seized with an inexplicable feeling, perhaps of horror or fright or of intense nervousness; he is often afraid lest he should have an irresistible impulse to injure himself or others, and in extreme cases so great is his dread of suicide that he will remove all ropes or poisons from his house and abandon shaving. Nevertheless, he has no impulse or desire to commit suicide, what he actually dreads is the sudden occurrence of a self-destructive impulse so strong that he would be unable to resist it. The very thought makes him sweat with terror. The sense of misery in the head leads him to imagine that he is going out of his mind. Some patients, when left by themselves, are seized suddenly with a feeling of panic often associated with a sensation of sinking referred to the pit of the stomach. Others are always taken ill if they happen to be in a place from which they cannot get immediate egress if necessary, such as a theatre or church or express train. In consequence they insist on sitting next the door. In other cases the trouble is a thought or idea which haunts the mind and cannot be got rid of, such an idea being termed by neurologists an imperative conception. Many of these patients always carry a flask of

spirits about with them : they always have it with them but never use it. In fact the essential feature characterising all these "phobias" is the dread of some emergency for which preparation cannot be made. Other patients are irritable, angry at the slightest cause, depressed, taciturn.

Headache, giddiness, sleeplessness, loss of appetite, furred tongue, dyspepsia, and anæmia are all met with.

The reader may think that some of the preceding are exaggerated as mental symptoms accompanying chronic colitis. Let us assure him that they have all been observed on patients without any serious nervous disturbance.

Visceral Symptoms.—It is quite the rule for the general nutrition to suffer in cases of chronic colitis, especially when the affection is complicated with catarrh of the small intestine. This disturbance of nutrition is frequently accompanied by a greyish discoloration of the skin, which has been described by Arbuthnot Lane and others as characteristic of auto-intoxication from the intestines.

In chronic colitis it is quite usual for the intestinal affection to be accompanied by some abnormality of the digestion in the stomach, the precise condition varying, being in some cases a chronic gastritis and in others some disturbance of the type of gastric neurasthenia. In many cases

we find all the gastric symptoms characteristic of chronic gastritis, viz. coated tongue, fullness in the region of the stomach, loss of appetite, headache, eructations, flatulence, nausea and discomfort after eating, when a most careful examination of the gastric digestion by means of test meals fails to show anything abnormal in the gastric digestion.

Anæmia is frequently met with in chronic colitis, and in many cases depends upon destruction of blood corpuscles by hæmolytic toxins produced in the intestines.

Patients frequently lose from 15 to 30 pounds in weight, and, especially in the cases with a raised temperature, a suspicion of tuberculosis is needlessly aroused in the mind of the medical attendant. In other cases malignant disease is closely simulated; in fact one of the most remarkable features about chronic colitis is the intensity of the general symptoms which are often met with. With comparatively slight intestinal symptoms the patient is to all intents and purposes a confirmed invalid.

We shall now attempt further to elucidate the symptoms of chronic colitis and familiarise the student with its clinical phenomena by giving a brief description of the ordinary types which are encountered in practice, taking them in the following order—

Type 1. Evolution of chronic colitis in a case of chronic constipation.

Type 2. Chronic colitis with alternating constipation and diarrhoea.

3. Chronic colitis with intercurrent attacks ("Crises").

4. Chronic colitis with hypersecretion of mucus but without membranes.

5. Muco-membranous colitis or colic.

6. Pseudo-malarial.

7. Pseudo-typhoid and dysenteric.

Type 1.—Evolution of Chronic Colitis in a Case of Atonic Constipation

Atonic Constipation in the First or Atonic Stage.—The patient, probably of middle age, enjoys general good health, and the only symptom of any kind is constipation, from which he has suffered since childhood. At school the daily functions of the bowels were neglected and for many years laxatives have been employed, at first only occasionally, latterly every day in order to secure a daily motion.

The symptoms in this stage will be merely sluggishness of the bowels without either pain or flatulence, although the patient has suffered from constipation for a considerable time. Moderate daily doses of a laxative still produce satisfactory results *but require to be continually increased*.

The stools are normal in size and consistency; the only mucus that is passed with them is a thin

coating on the surface of the fæces. The colon and sigmoid if empty cannot be felt by palpation and are not sensitive to pressure.

In the type of atonic constipation depending upon deficient amount of cellulose in the food or upon excessive digestion of it, we shall find the stools dry and hard and small in amount.

In some cases the rectum may be found full of fæces immediately after the bowels have been moved.

The Catarrhal Stage of Chronic Constipation.—After the atonic stage has lasted for a variable time, perhaps for some years, the patient will commence to be troubled with flatulence and distension, with perhaps rumbling and gurgling intestinal sounds occurring from two to four hours after a meal. These symptoms may in other cases come on only before the bowels are opened, after which relief occurs. An examination of the stools will show that they are every now and then accompanied by the passage of a little mucus. The patient also has uneasy sensations along the course of the colon, often amounting to actual pain after the bowels have been opened. At this stage purgative medicines will still open the bowels, but much larger doses are required. *About this time the patient will probably begin to show some deficiency in nerve tone and become tired more easily and quickly than usual.* Occasionally a slight attack of diarrhoea

occurs in which three or four loose stools are passed, after which the intestinal disturbance is for a time corrected. Colitis has commenced.

The Spastic Stage.—It is very rare indeed that a patient seeks advice in the first stages of chronic colitis. He does not usually come until the disease has passed well into the spastic stage, by which time the inefficiency of purgatives is becoming an increasing difficulty to him.

The great landmark in this stage is the occurrence of pain which marks the line of demarcation from the first or catarrhal stage. The continued use of purgatives with the resulting catarrh has so irritated the intestine as to have set up a permanent condition of hypertonus of the muscle. It is worthy of note that in hysterical and neurotic individuals this stage can occur much earlier in the evolution of the disease.

The degree of pain is variable. In mild cases there may be merely abdominal discomfort, sometimes diffused, sometimes localised in the colon or sigmoid. In more severe cases there may be attacks of flatulent colic. In the worst cases typical attacks of muco-membranous colic may occur. Purgatives now begin to prove useless and give rise to more or less pain, and to ensure a daily action of the bowels the patient is obliged to employ enemata which sometimes are without effect, sometimes set up considerable pain, and

the volume of which has continually to be increased.

On palpating the abdomen, the colon and sigmoid can be felt contracted and simulating a thick walled rubber tube. The abdomen is more or less sensitive to pressure either over the whole length of the colon or in certain areas only.

The rectum is either empty and contracted or filled at its highest point with small fragments of fæces. Occasionally it will contract upon the examining finger.

In giving an enema resistance will be found, and after a little fluid has passed in the remainder will be arrested. Often the fluid injected will be forced back into the douche can.

The fæces are characteristic; they are generally in small pieces, square in section, from a quarter to half an inch in diameter, and often accompanied by macroscopic mucus. In this stage the patient will almost certainly be found to be suffering from some of the general symptoms enumerated on p. 45, *et seq.*

Type 2.—Alternating Constipation and Diarrhœa

The patient has suffered from constipation for several years, and has taken an occasional purge. He does not take laxatives regularly because he

gets a daily motion of some sort or another, which, however, appears to him to be inadequate and is not followed by that sense of *bien-être* which should follow a complete and satisfactory evacuation of the bowels. Latterly he notices that occasionally he gets an attack of looseness of the bowels, lasting several days, and that these attacks occur with a certain amount of regularity, a week or ten days of constipation being followed by three or four days of diarrhœa, during which he passes from two to six stools every day.

The looseness of the bowels comes on apparently without any cause, but a careful examination of the stools will explain the condition. We shall find that after the attack has commenced, the first few stools consist of scybalæ, the succeeding ones contain more and more mucus, until after they have become quite liquid they gradually decrease in number and the condition of constipation is re-established. It is thus evident that the fæcal material collects in the cæcum and ascending colon until the direct irritation of its presence and of the products of its fermentation and putrefaction sets up hypersecretion of mucus with exaggerated peristalsis. As soon as the fæces have been expelled everything as a rule rights itself and the cycle again commences. In other cases, if the affection continues to be untreated or inadequately treated, recovery from an attack is not

obtained so easily, and a period of true diarrhœa corresponding to an exacerbation of the colitis follows the loose stools. In fact, the colitis has been aggravated into a subacute stage.

Mathieu,¹ as the result of minute study of these cases, says that the first stool in the attack of diarrhœa consists of the liquid secreted above the fæcal mass, and is passed in the form of a purée. The second stool will consist of the fæcal mass itself, will be much larger in bulk, and may be formed.

The same author draws attention to a variation in this type in which there are two stools a day, the first fairly solid, the second liquid. His explanation is that the fæcal retention in this instance is in the sigmoid.

Type 3.—Chronic Colitis with Acute or Subacute Attacks occurring at Irregular Intervals

In the type which we have just studied, the constipation and looseness of the bowels alternated more or less regularly. It is more usual for sufferers from chronic colitis to experience acute attacks at irregular intervals, such attacks being quite independent of fæcal retention. As far as is known, they are the direct result of an

¹ Mathieu, *Pathologie Gastro-intestinale*, p. 437.

accumulation of the products of putrefaction or of their production upon a larger scale than the defences of the organism can combat. These substances irritate the mucosa and paralyse the normal resistance of the body, whilst at the same time the virulence of the organisms themselves appears to be temporarily increased. The immediate exciting cause is often a chill, over exertion, any premature departure from the prescribed diet, food which is tainted, or any circumstance which will temporarily depress the vitality.

The patient can usually feel the attack coming on ; the appetite becomes poor, the tongue furred, and there are perhaps such symptoms as headache and general malaise. Then the stools become loose and in severe cases there may be vomiting.

Upon examination, the abdomen is found to be soft and not distended, and on palpation the small intestine appears to be quite normal. The large intestine will probably present areas which are quite normal ; others (which are the seat of the inflammation) are spastic and convey to the examining fingers the sensation of a thick-walled india-rubber tube. Other parts again are soft and atonic, corresponding to the condition described by Combe and De Langenhagen as *intestin en chiffon* (*vide* Diagnosis, p. 66). As a rule the abdomen is not tender on deeper pressure.

There will now be several loose stools à day,

consisting very largely of mucus, and the patient will appear to be really ill. However, under appropriate treatment, the attack subsides and the chronic colitis quiets down to its accustomed condition.

These attacks very rarely occur in patients who keep themselves under competent supervision and are content to make additions to their dietary only when a microscopical examination of the stools shows that the foodstuffs taken are being well digested and that additions to the menu may with safety be tentatively made. But patients who try to treat themselves rarely have the patience to continue one article of diet sufficiently long before venturing upon something else, but fruitlessly attempt to hurry the progress of their cure. There are unfortunately also medical men who rely upon the sensations of the patient as to whether the food is digesting properly, and neglect the routine use of the microscope in deciding what additions may safely be made to the diet list. These naturally do not have a large percentage of successes, but find that chronic colitis is exceedingly rebellious to treatment.

It is certainly not generally recognised that chronic colitis in a mild form is an exceedingly common complication of constipation. Many people suffer from it unknowingly, and wonder why the "constipation" of which they complain

is so obstinately resistant to treatment. In other patients neurasthenic symptoms predominate, and the underlying intestinal condition is either overlooked or regarded simply as part of the disease. They are diagnosed as suffering from nervous breakdown or over-work and are told to take prolonged holidays. But the condition is not cured by rest and change of air.

Till recently "colitis" was not diagnosed until what we have described as the extreme stage was reached, the stage when membranes are expelled and attacks of typical colic occur, the stage fortunately reached by very few patients.

In most patients the important symptoms are the discomfort and dyspepsia, the constipation and the chronic invalidism and inability to do a proper day's work.

Type 4.—Chronic Colitis with Hypersecretion of Mucus but without the Formation of Membranes

In this form there is a largely increased secretion of mucus with the consequence that there are two or more stools a day, consisting of mucus intimately mixed with pultaceous fæces and occasionally scybalæ. As a rule the patients come complaining of "diarrhœa," but the presence of the scybalæ suggests that there is actually constipa-

tion, a conclusion which will be confirmed by the carmine or charcoal test (*vide* p. 74), demonstrating that the time taken by the food to pass through the gastro-intestinal canal is in reality increased.

These cases are of extreme importance because they are hardly ever primary but in most cases are secondary to the irritation of some serious lesion of the large intestine, such as a malignant growth or polypus. A particularly careful examination should therefore be made in all such cases, making use as a matter of course of the sigmoidoscope. For one's own reputation it is safer to decline to treat patients who will not allow the necessary examinations to be made. It would hardly be credited, if one had not constantly examples, that patients, even after having had pointed out to them the reasons why such an examination is necessary, often decline to allow it to be done, and place themselves in the hands of some practitioner who has not sufficient knowledge of the subject to see the necessity and who, chancing that there is nothing serious the matter, dismisses them with a prescription for an intestinal astringent.

The cases which are primary are among the most difficult to cure, and often demand all the resources which we have at our disposal.

This condition has recently been ascribed by Ewald and others to a neurosis and termed myxoneurosis intestinalis.

Type 5.—Muco-membranous Colitis

This condition which, as we have seen, was formerly described as a distinct affection, is now considered to be merely a type or stage of chronic colitis and is characterised by the three symptoms :

1. Habitual constipation.
2. Frequent or daily attacks of colic.
3. The more or less regular expulsion of false membranes composed of solidified mucus.

Although the constipation is by far the most important of these symptoms both from the standpoints of diagnosis and treatment, patients generally come to the physician complaining of diarrhoea, for the constipation which precedes the expulsion of the false membranes is eclipsed by the more spectacular diarrhoea which attends and follows their expulsion.

The constipation, as we have seen, is due to spasm of the intestine ; in fact muco-membranous colitis is frequently merely the next stage after the spastic one in the evolution of atonic constipation.

Pain more or less intense is, we may say, invariably present, and although usually occurring in paroxysms is occasionally constant for short periods. The paroxysms in neurasthenic patients often assume considerable severity and approach in intensity the pain of renal or biliary colic.

This type of chronic colitis, when it is not a stage in the evolution of constipation, usually com-

mences gradually, the first symptoms being those of ordinary indigestion, gastric and intestinal. After a longer or shorter interval the characteristic phenomena appear, and the patient, if not already neurasthenic, begins to become so. The characteristic paroxysms are at first usually slight and occur at comparatively long intervals of perhaps a month or two. As the disease progresses the intervals between the paroxysms gradually diminish whilst at the same time the attacks increase in intensity. The pain commences with a feeling of uneasiness referred to the lower abdomen and increases in intensity until it reaches its maximum, when there is a discharge of membranes which gives complete relief. The pain may be described as a mixture of colic and tenesmus and is of a peculiarly sickening character, producing, according to Butler,¹ "a facies like that which follows pressure on a tender ovary. There is almost invariably abdominal tenderness, sometimes so general and so intense as to simulate peritonitis."

The tenderness is usually most marked over the region of the sigmoid, but it may in many cases extend to the right iliac region. Occasionally there is also vesical tenesmus.

The membranes passed vary in appearance from a few shreds to large sheets or complete casts of the intestine. The quantity passed also varies in amount, the greatest quantity recorded

¹ Butler, *Diagnostics of Internal Medicine*, p. 789.

being six pounds in one attack. The affection is invariably accompanied by loss of weight and strength and there is often some degree of anæmia. There may also be present as complications, local affections of the rectum such as prolapse or piles, and evidences of implication of the duodenum such as jaundice.

The symptoms which have been observed practically cover the whole field of neurasthenia and hysteria and need not be again enumerated.

Type 6.—Pseudo-Malarial

Cases are often afebrile. In others an evening temperature may be constant, intermittent, or transitory. Not infrequently mistakes of diagnosis occur, as the patients omit to mention to the physician their symptoms of colitis. This is especially the case when the colitis is unaccompanied by crises. The acute crisis of ordinary chronic colitis is very often accompanied by a sharp rise of temperature which persists for a day or two. Couto¹ has recently pointed out that in mucomembranous colitis we find several different type of intermittent fever which are frequently mistaken for malaria.

1. There may be a quotidian fever which persists for several days after an acute attack has occurred, disappears for a few days, and then recurs. This type usually lasts for four to eight hours every

Couto, *Deut. med. Woch.*, April 17, 1913.

evening and is accompanied by slight malaise and headache. There are no rigors or excessive perspiration.

2. The patient shows an evening temperature persisting for months without intermission. Couto cites the following typical cases:—

A married woman, æt. 38, suffered from mucous colitis. Colic and constipation alternated with diarrhœa, during which intestinal sand and mucus were passed. For seven months the evening temperature ranged from $99\cdot5^{\circ}$ to $100\cdot4^{\circ}$. Malaria was diagnosed, but appropriate treatment had no effect. The fever ceased as soon as calomel, followed by a saline purge, was given.

In another case a man, æt. 32, suffered from obstinate constipation and diarrhœa, with the passage of nummular, membranous, and filamentous mucus. Temperature ranged from $99\cdot3^{\circ}$ to $100\cdot4^{\circ}$. Recovery ensued on treating the colitis.

Type 7.—Pseudo-typhoidal and Dysenteric Forms

Both are exceedingly rare. In the former, a raised temperature together with the enteric condition suggests typhoid fever, a diagnosis negatived by the Widal reaction. The dysenteric form is distinguished with difficulty from acute ulcerative colitis from which it differs by its less general severity and its greater amenability to treatment.

CHAPTER V

DIAGNOSIS

It will be readily understood from the remarkably protean nature of the symptoms which have been elaborated in detail in the preceding chapters, that a diagnosis depending upon any one or even upon any one group alone would be impossible. As in the case of practically all other diseases, the question of differential diagnosis from a number of conditions which more or less closely simulate it has first of all to be considered. But, in addition, in probably no other disease is there a greater tendency to overlook the main issue by centring the attention upon some concomitant phenomenon.

And in no instances is this greater than in the differential diagnosis of the acute exacerbations and crises of chronic colitis from some acute abdominal conditions for which they are very likely to be mistaken. We may instance appendicitis (to which reference has already been made), biliary colic, renal colic, typhoid fever, dysentery, and intestinal obstruction.

These conditions need merely be mentioned, as

their recognition hardly comes into the scope of this book.

We will therefore at once proceed to outline the course of procedure which should be followed in the case of a patient presenting the symptoms which point to the probability of chronic colitis.

A. THE EXAMINATION OF THE ABDOMEN

This will usually be the first physical examination to be carried out. Whilst it is possible to undertake it in the consulting-room, it is far better to do so whilst the patient is in bed where he has been lying quietly for some hours. The points which should be looked for are the following :—

1. **Spots of Cutaneous Hyperæsthesia.**—The areas of cutaneous tenderness pointed out by Head as corresponding to disease of internal organs have been verified in most particulars by subsequent observers. To be on the safe side, however, it will be prudent to accept the maxima only. Those which correspond to the intestines as far down as the upper part of the rectum, are the ninth, tenth, eleventh, and twelfth dorsal segments. Their respective positions are: left costal margin about the centre and one inch from the edge of the ribs; just to the right of the umbilicus; just above the left anterior superior spine; and just above the middle of the right Poupart's ligament.

2. Spots which are tender upon deep Pressure.—These, which are frequently encountered in a case of colitis, are met with along the course of the colon. Most writers upon neurasthenia have described these tender spots as characteristic of neurasthenia. Their real significance is an overlooked colitis to which the neurasthenia is secondary.

3. Rigidity of the Recti Muscles.—Rigidity and even hypertrophy of the right rectus is very common in ulcer of the duodenum, of which it is one of the characteristic diagnostic signs.¹

4. The Presence of Gastropptosis, Enteropptosis, or Nephropptosis.—These are important as indicating the condition described by the Germans as the “habitus enteropptoticus.” In conjunction with Stiller’s *costa decima fluctuans*, they suggest a strong neurasthenic tendency. (There is, as we have already pointed out, a possible causal relationship between a pptosis and the colitis.)

5. The Physical Condition of the Colon itself.—We must first determine whether it is palpable or not, and if palpable, whether it is full or empty, thin-walled or thick-walled, spastic (*en tuyau*) or relaxed (*en chiffon*), narrow or dilated.

¹ *Vide* “Points in the Diagnosis and Non-Surgical Treatment of Duodenal Ulcer,” by George Herschell, *Interstate Medical Journal*, vol. xix., No. 3, 1912.

To most medical men it will come as a great surprise that one can not only palpate the colon but that one can determine its exact position, its condition of emptiness or fullness and whether its contents are gas, liquid, or solid, whether its walls are thickened or thinned, flaccid, or in a state of spasm. Curiously enough, although the ability to ascertain these points of information dates from the important work of Vincent,¹ published in 1898, which placed the subject upon a scientific basis and gave full directions for making the necessary examinations, only a few specialists in diseases of the stomach have availed themselves of the method. In the medical schools the student is taught to palpate the abdomen for thickenings and tumours, but, so far as we know, not the slightest hint is given him of the information he can obtain as to the physical condition of the intestine or the technique of obtaining it.

B. EXAMINATION OF THE LOWER BOWEL BY THE SIGMOIDOSCOPE

This naturally follows the examination of the abdomen and should never be omitted, as its use may at once establish the diagnosis. Sigmoido-

¹ Vincent, *Traité de l'exploration manuelle des Organes Digestifs*. Paris, 1898.

scopic examination is best conducted in the morning after the bowels have been opened. By its aid we should be able—

(a) To discover any tumour or ulcer below the sigmoid flexure.

(b) To examine directly the condition of the mucosa of the lower part of the pelvic colon.

Sigmoidoscopy enables us to establish without any doubt the presence or absence of an inflammatory condition, and to decide whether it is of an atrophic or hypertrophic nature. Similarly the presence or absence of erosions and of follicular or deeper ulcerations, can be noted.

(For the technique of sigmoidoscopy the reader may be referred to the various monographs upon diseases of the rectum, and especially to *Atlas der Rectalen Endoscopie*, by Foyes, published in Berlin.)

C. DIAGNOSTIC LAVAGE OF THE COLON

This is the next procedure and naturally immediately follows the examination with the sigmoidoscope. The technique as elaborated and used by Dr. Herschell will be described.

The apparatus required is one of Herschell's large size funnels, to which are attached a couple of feet of rubber tubing and a colon tube. The ordinary Gentile stomach tube, size 10, makes an

admirable colon tube and is the one we ourselves always employ. The patient is placed on his left side with his buttocks projecting over the edge of the bed. A toilet pail is placed alongside the bed and the operator takes his seat at the side facing

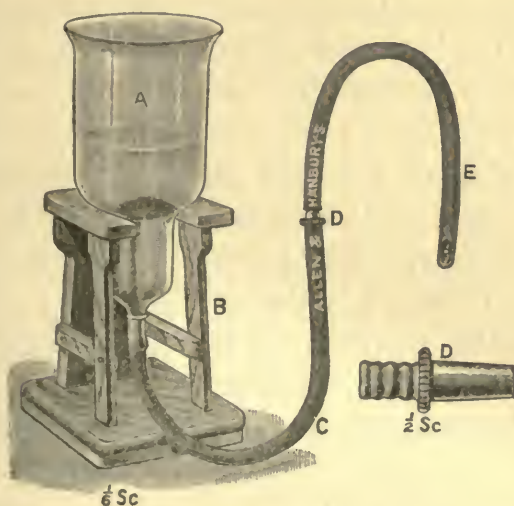


FIG. 1.—DR. HERSCHELL'S APPARATUS FOR LAVAGE OF STOMACH OR INTESTINES.

A. Large glass funnel specially shaped for convenience in handling with large calibre stem. B. Stand for funnel when performing autolavage of stomach single-handed. C. 2 or 3 feet rubber tube. D. Metal conical connection for coupling up large rubber tube C to smaller calibred colon tube. E. Colon or stomach tube. The latter should have terminal eye and one lateral one close to the end; the ordinary tube with two eyes at different levels is useless.

the patient's feet. A nurse stands on his right hand side provided with a jug of normal saline solution at 100° Fahr. The end of the tube is lubricated and introduced into the rectum just through the internal sphincter. The nurse now pours about

a pint of the solution into the funnel, which she holds just above the level of the patient's body, and delivers into the hands of the physician, whose other hand is occupied in holding the tube which has been inserted into the anus. The physician now, by a procedure which it is difficult to describe, but which consists in raising the funnel and then pushing on the tube at the moment when the bowel becomes distended with liquid in front of it, advances the tube until it has entered the pelvic colon. This method of introducing a tube into the colon is not generally known, but is the only method of introducing a tube any considerable distance. In any other way it is quite impossible, except by good fortune, to pass a tube beyond the recto-sigmoidal junction, as the tube simply doubles up and coils upon itself. It is only by expanding and straightening out the gut in front of the advancing tube that the numerous obstacles which prevent the passage of the tube are avoided. It may in fact be taken as beyond the necessity of proof that in the majority of cases, the physician who, having introduced a soft rubber tube 18 inches or so into the intestine, flatters himself that he is getting it into the transverse colon, is simply deceiving himself. X-ray examination has repeatedly shown, in similar cases, the whole rubber tube coiled up in the ampulla of the rectum.

When the tube has been introduced beyond the recto-sigmoidal juncture, the saline fluid is allowed to flow into the bowel until a pint or so has entered. The funnel is now lowered and the whole allowed to escape from the tube and flow into the toilet pail which stands beside the bed. In this way, any small faecal remnants which may have been adherent to the mucosa of the bowel are cleared away.

A fresh pint of saline solution is now introduced, and this is allowed as before to flow out of the tube again; but, instead of allowing it to escape into the pail, the funnel is turned upon its side and the fluid allowed to return into it. The funnel is then raised and the same fluid allowed to flow back again into the bowel. It is then passed backwards and forwards from the funnel into the bowel until presumably it has washed off all that is possible from the surface of the mucosa. It is finally received into a glass jug and retained for a subsequent examination, which consists essentially of a microscopical examination of the residues obtained by the centrifuge. From a healthy colon the water will return almost clear; there will be only a small amount of faecal particles, mucus, and epithelial debris. In chronic colitis mucus will be abundant in the wash water from which it can be precipitated by means of lime water. There will probably also be fragments of the colon mucosa, leucocytes,

nuclei, and often red-blood cells. Small mucous masses can be distinguished by their staining green with Ehrlich's triacid stain, whilst fibrin takes on a red coloration.

D. EXAMINATION FOR ANY SOURCE OF INFECTION

We have already pointed out that undoubtedly the commonest source of chronic septic absorption is from the mouth, the patient suffering from pyorrhœa alveolaris or Rigg's disease, and we would here strongly impress upon the reader not only the importance of examining the mouth but also the absolute necessity that he should examine it himself and not trust to the patient's statement that his mouth has recently been examined by the dentist and pronounced sound. Whilst the many able and conscientious men who fortunately form the bulk of the dental profession are quite alive to the importance of looking for and treating pyorrhœa, there are yet some who, actuated by motives of expediency, prefer to ignore it. The treatment for pyorrhœa is tedious and not at all pleasant to the patient who is moreover very unwilling to pay such fees as will properly compensate the dentist for efficient treatment. The patient cannot be persuaded that he is receiving value for his expenditure; he has no

visible evidence of improvement, to say nothing of his difficulty in appreciating the influence upon his system of a mere local disturbance which causes him no inconvenience.

When examining for pyorrhœa, regard with suspicion any tooth from which the gum is retracted, and press with the end of the finger or any smooth rounded body against the edge of the gum in this situation. If pyorrhœa be present, pus will be seen to ooze up around the neck of the tooth. Treat in a similar manner any other tooth around which the gums are reddened even if there is no retraction, and finally press upon the top of any gold crown or piece of bridgework. Having established the presence of pyorrhœa, it is always an advantage to have some X-ray photographs taken of the alveoli in order to see how much damage has been already done to the process. (Incidentally it may be noted that a skiagram will demonstrate the existence of pyorrhœa alveolaris before it can be detected by any other means.) Small pieces of thick celluloid film coated with emulsion, each in a small opaque envelope, are placed inside the processes and kept pressed against the backs of the teeth by the patient's thumb. The X-ray tube is held a little way in front of the mouth. The small pictures obtained each show two or three teeth in which can be seen not only the amount of bony absorption but also the

presence of rarefying osteitis in the alveolar processes.

Another common source of pus is of course the naso pharynx; and if there is any evidence or suspicion of post nasal catarrh the patient should be sent to a laryngologist for an opinion.

E. EXAMINATION OF THE STOOLS WITH SPECIAL REFERENCE TO THE EFFICENCY OF DIGESTION

This is done with the following objects:—

1. The estimation of the time taken for the food to traverse the alimentary tract.

This may be estimated either by following the shadow of a bismuth meal upon the radiographic screen or by administering a dose of some inert colouring matter, such as carmine or vegetable charcoal, and observing when it appears in the stools. The radiographic method is unfortunately only at the disposal of those medical men who live in large centres and have access to a properly equipped radiographic laboratory and to whose patients the question of expense is not important; or to the fewer number who have an installation in their house and the technical knowledge to use it efficiently. The charcoal or carmine capsule,

besides being of universal application, will often reveal much more than the Roentgen rays and is indeed often indispensable.

In this country, diagnosticians have accorded surprisingly little study to the actual time taken by the food to pass through the alimentary canal, yet this detail has a clinical importance as great as that of the daily number of stools. For instance, it is not at all unusual for a patient to have one stool a day and in consequence very naturally consider the bowels to be regular, whilst all the time there is a latent constipation with retention of faecal matter, giving rise to chronic ill-health from auto-intoxication.

(a) In cases of diarrhoea, the passage of the charcoal in the normal time would tend to show that the peristalsis in the small intestine was not increased and that the disturbance was in the lower portion of the large intestine.

(b) In diarrhoea, an unduly rapid appearance of the charcoal or carmine in the stools would suggest that the trouble was in the small intestine or ascending colon.

(c) A dose of charcoal given at breakfast to a patient who has daily motions should appear in the next morning's stool. If it fails to do so there is a latent constipation. If, after the stool, lavage of the sigmoid brings away black faeces, there is retention in the lower bowel. If lavage fails to do

so, the delay is in the cæcum, the ascending, or the transverse colon.

(*d*) In a patient who does not have a daily motion, the removal of black fæces by lavage of the sigmoid on the morning following the administration of the cachet would show that atony or dilatation of the lower bowel was an important factor in the production of constipation.

(*e*) Appearance of black stools for several days after the administration of a dose of charcoal points to atony of the bowel and latent constipation.

(*f*) By administering a dose of charcoal or carmine at the commencement of a test intestinal diet we are able to mark off the moment when it commences to appear in the stools and when we may use such stools for purposes of examination as corresponding with certainty to the test diet administered.

(*g*) We may mark off and obtain the total fæces corresponding to a test diet extending over a fixed period by giving charcoal or a carmine cachet at its commencement and termination (provided that there is no latent constipation).

2. The estimation of the actual condition of digestion in the alimentary tract.

The investigation of the functional perfection of the process of digestion by administering certain food and then examining it after it has been exposed to the action of the digestive processes, is

an example of the newer type of scientific methods which are every day coming more extensively into use, and strengthening the resources of clinical medicine.

The method of estimating the process of digestion by the examination of the contents of the stomach after a test meal, until recently the only one in common use, suffered from the disadvantage that the information derived related solely to the condition of digestion in the stomach, whilst, as is well known, the major part of digestion takes place in the small intestine. Moreover, the information which we derived was not as definite as one could wish because of the number of factors which needed to be taken into consideration. For instance, the degree of gastric acidity depends not merely upon the percentage of acid in the gastric juice secreted but also upon the sum total of gastric juice secreted, the rapidity with which the stomach empties itself, the combining power of the food, and other factors which vitiate the result of the test as performed in the only manner practicable in daily practice.

It is quite otherwise with the examination of food which has passed through the whole process of digestion in the body and finally appears in the stools. Here there is no guess work, no factors have to be allowed for. We see the food which the patient eats, we find its remains in the

stools, and we are able therefore to conclude exactly what constituents of that food have been utilised during their passage through the body. As a matter of practice, the patient must be placed upon a test diet containing that amount of the different things which ought to be digested without difficulty by a healthy digestive system. Such an amount must be definitely limited. For instance, we all eat considerably more meat in the day than our digestion can completely deal with: in ordinary circumstances, therefore, to find fibres of undigested meat in the stools would mean absolutely nothing. But let us limit the amount of meat consumed in the twenty-four hours to 125 grammes, an amount which ought normally to be entirely digested. In these circumstances the finding of undigested meat residues would have a very important significance.

The technique which we use at present is as follows:—

The patient is placed upon a test diet for three days, at the commencement of which period he is given a teaspoonful of vegetable charcoal or a capsule of carmine as an indicator. When the charcoal or carmine appears in the stools we know that we have come to the end of the food which was already in the intestines, and that what will now be passed will be the product of the test diet and may serve for examination.

The test diet we use is a modification of Schmidt's, differing only in minor detail. The reader may make use of Schmidt's original diet with every confidence. As soon as the stools are passed they should be examined, in as fresh a condition as possible, by macerating them with water in a Petri dish and examining by transmitted light, using the stage of a large microscope or a Koenig's table, which has been designed especially for this purpose.

After the macroscopic examination, the stools are examined with a microscope, using a low power, such as a $\frac{3}{4}$ or 1 inch objective.

The chief things which must be looked for are undigested muscular fibres, connective tissue, undigested stained nuclei, potato residues, starch, fat, mucus, red and white corpuscles, crystals, and hæmoglobin.

Meat Residues

As the digestion of meat is only commenced in the stomach where the fibres are merely split up by the solution of the membrane covering them and binding them together and is completed in the intestine mainly through the agency of the pancreatic juice, it necessarily follows that the presence of undigested muscle fibres in the stools will point to intestinal indigestion, with a

strong probability that the pancreas is at fault. Fully digested meat fibres should appear in the stools either as homogeneous masses of a light yellow colour or as small elongated bodies with rounded ends. In either case all appearance of striation should have disappeared.

Undigested or imperfectly digested meat fibres appear as bundles with square ends in which the striation is usually well marked.

Connective Tissue Fibre

Raw connective tissue is digested only by the gastric juice. It is evident, therefore, that if we give a moderate amount of raw meat and fail to find undigested connective tissue fibres in the stools, the gastric juice must be normal. On the other hand, the presence of connective tissue would suggest deficient action of the gastric juice. Attempts have been made to avoid the examination of the stools, notably by Sahli of Berne, who enclosed a pilule of methylene blue in a little bag of indiarubber tied up with catgut. When the catgut became digested the methylene blue was liberated and transmitted to the urine its characteristic colour. An alternative method was that of Einhorn of New York, who tied a piece of catgut round a large bead, which the patient swallowed and which was sub-

sequently recovered from the stools. But unfortunately for both these methods it was found that catgut is dissolved by the pancreatic juice. Reliance also could not be placed upon using a shred of connective tissue itself, which was tried instead of catgut, since one cannot base a clinical conclusion upon the behaviour of a single small piece of tissue. As a matter of fact, as Mathieu¹ has pointed out, in researches, always rough, on utilisation of foodstuffs, we must experiment with considerable masses of material if we would avoid errors. The connective tissue in 125 gm. meat should be digested in one day. The presence then of connective tissue in any quantity in the stools signifies a disturbance of the gastric digestion. And it is really to estimate the connective tissue digestion that it is necessary to put the patient upon the test diet containing the minimum of meat, for when a patient is on ordinary diet (especially if he is taking ham) plenty of connective tissue can be found macroscopically as well as microscopically in the stools. It is essential that the meat given in the test diet should be very underdone in order to provide practically raw connective tissue, for well-cooked connective tissue is readily digested in the stomach.

If we find both muscular fibres and connective tissue in the stools, it is certain that both gastric

¹ Mathieu, *op. cit.*, p. 405.

and intestinal digestion are at fault. The sole exception to this rule is the condition of hypermotility of the alimentary canal when undigested food of every kind is hurried along to be discharged from the body.

Muscle Nuclei

Muscle nuclei are composed of a mixture of phosphorus and albuminoid matter combined in such a manner as to be entirely incapable of digestion in the stomach. It is only in the intestine that their solution takes place, the principal agent being the pancreatic juice assisted probably by the succus entericus, whose rôle is probably limited to supplying the hormone, secretin, which stimulates the flow of pancreatic juice. It has also been established that upon a prolonged stay in the intestines these nuclei will become dissolved as the result of bacterial action.

The credit for the idea of using meat nuclei as a test of the efficiency of pancreatic digestion must be given to Schmidt, who administered to his patients little bits of raw meat, enclosed in bags of gauze, which were then retrieved from the fæces. A microscopical examination of the condition of the nuclei could be made by imbedding, cutting, and staining sections in the usual manner. Einhorn improved upon this method by substituting little pieces of raw thymus which is rich in muscle

nuclei. The contents of the bags had only to be wiped upon a microscope glass to obtain a satisfactory film which could be readily stained and examined.

Both these methods have been superseded by the production commercially of dried stained nuclei in the form of a powder which is administered to the patient in capsules and can be readily recognised in the stools. To render their recognition more certain they are mixed with lycopodium grains. When the latter are visible in the stools the sample is examined for nuclei, and if these are present pancreatic insufficiency is certain.¹

Residues of Potato

These will point to a deficiency of amylolytic ferment in the pancreatic juice. This will be confirmed if a large amount of gas and a subsequent acid reaction is produced in Strasburger's fermentation tube.

Excess of Fat in the Stools

This may depend upon various factors, *e.g.* insufficient or inadequate bile or pancreatic juice, deficient absorption, and other factors which will be treated later.

Thus by the simple microscopical examination

¹ The stained nuclei are to be obtained in the form of capsules from Merck.

of the stools after a proper test meal, we are able to conclude from the following data :—

- | | |
|---------------------------------|--|
| (a) Connective tissue present . | The gastric juice is defective. |
| Nuclei present. Muscular | |
| fibre badly digested . | The pancreatic juice is defective. |
| (b) Connective tissue present . | The gastric juice is defective. |
| Nuclei absent. Muscular | |
| fibre well digested . . | The pancreatic juice is normal. |
| (c) Connective tissue absent . | The gastric juice is normal. |
| Nuclei present. Muscular | |
| tissue badly digested . | The pancreatic juice is defective. |
| (d) Connective tissue absent. | |
| Nuclei absent. Muscular | |
| fibre well digested . . | Gastric and intestinal digestion normal. |
| (e) Potato starch present . . | Indigestion in the small intestine. |

In cases in which the presence of nuclei and muscle fibre points to pancreatic insufficiency we have several supplementary tests which may be employed.

Alteration in the Utilisation of Fat.

Excess of saponified over unsaponified fat in the fæces may point to increased activity of the pancreatic secretion. It is frequently met with in hyperchlorhydria as the direct result of the excess of free HCL, the natural activator of the pancreas. Such an excess of pancreatic secretion is, in all probability, exceedingly common in the pancreatic

catarrh which forms the first stage of chronic pancreatitis. Excess of saponified fat may also be due to the action of bacteria and denotes abnormal putrefactive processes in the upper part of the intestine. When this is the case there will invariably be other evidence of putrefactive processes in the intestine, such as indicanuria and the usual syndrome of auto-intoxication. There may also be evidence of defective pancreatic secretion, such as the presence of undigested muscle fibre and a positive tryptic insufficiency test, and we shall in these circumstances be justified in assuming that the excess of saponified fat means intestinal catarrh.

Diminution of Saponified Fats

This will point to some degenerative change of the pancreas. It is often met with in the later chronic stage of intestinal indigestion; in conjunction with the pancreatic C reaction it will suggest cirrhotic changes in the pancreas due to long-standing chronic inflammation.

Excess of Unabsorbed Fat

This will show that there is some interference with the functions of the pancreas, provided that we can exclude defective gastric digestion, biliary obstruction, and an excess of fats in the food,

especially those, such as mutton fat, having a high melting point.

Tryptic Insufficiency Test

Of all the methods which have been devised for measuring the functional activity of the pancreas, the most direct and certain is that which consists in determining the presence of trypsin in the fæces. It has been established beyond doubt that a certain proportion of the trypsin of the pancreatic juice is not used up in the intestine and may therefore be found unchanged in the stools. *Il faut avoir trop pour avoir assez*, and Nature is not parsimonious but habitually supplies an excess of digestive fluids over the amount actually required. The demonstration of trypsin in the stools, an evidence of its excessive production, is a certain indication of complete pancreatic efficiency. Furthermore, a relative excess of trypsin in the fæces suggests a condition of catarrhal hypersecretion of the pancreas, such as occurs in the first stage of chronic pancreatitis. If, on the other hand, we find diminution or absence of the tryptic ferment in the stools, we may assume that there is some affection of the pancreas which materially interferes with its secretion.

The best method at present at our disposal for

estimating the amount of trypsin present in the stools appears to be that devised by Gross,¹ which is based upon the time taken by an aqueous extract of a given quantity of fæces to digest a standard weight of casein. To secure the best results it is important that the patient should be at the time upon a diet consisting mainly of proteins, a diet which has been shown to induce the largest output of trypsin in a healthy person. Normally, 10 cubic centimetres of a 1 in 3 suspension of fæces should digest three-quarters of a grain of casein in from twelve to fourteen hours. In abnormal conditions the time may be much reduced or extended. One ascertains the moment when all the casein is digested by failure to obtain a precipitate with acetic acid.

F. INVESTIGATION FOR EVIDENCE OF ULCERATION IN THE GASTRO-INTESTINAL TRACT

One of the greatest advances made during the last two or three years in the improvement of diagnostic methods has been that in the technique for detecting minute amounts of blood in the fæces (occult blood). As regards the diagnostic significance of the test, observers are generally agreed that a negative result is much more valuable than a positive one. For instance, in the absence of

¹ Gross, *Deutsche Medizinische Wochenschrift*, vol. xxxvi. p. 796.

hydrochloric acid in the stomach contents with no retention of food, the continued absence of occult blood in the stools would go far to negative the suspicion of a gastric carcinoma.

The information to be obtained from the presence of occult blood in the stools (the patient being on a hæmoglobin-free diet) may be briefly stated as follows:—1. The constant presence of occult blood strongly suggests malignant disease of the stomach or intestines. 2. Its intermittent appearance suggests a gastric or duodenal ulcer. 3. The appearance of occult blood in the stools of a patient who has been apparently cured of an ulcer of the stomach or duodenum is very suspicious of an impending relapse. As Boas has wisely advised, all cases of cured ulcer should have periodical examinations of the stools for occult blood for some months until the continued absence of blood is satisfactory evidence of complete healing. 4. The test for occult blood is of extreme value to us during the medicinal treatment of the stomach or duodenum as a guide to the prudence or otherwise of extending the diet. Should occult blood appear at any time after an increase of food has been given to the patient, it will show that the advance has been premature and that a return to the previous régime must be made.

In any case, the appearance of occult blood in the stools indicates that there is some bleeding

occurring in the gastro-intestinal tract with the absolute necessity for a thorough examination of the patient.

G. INVESTIGATION FOR EVIDENCE OF COLITIS

(a) **The Presence of Mucus.**—The pathology of the presence of mucus in the stools has been already discussed. There remains now to study the technique for discovering its presence. We have in the first place the statement of the patient. Mathieu and Roux¹ most appositely point out that medical men very often content themselves with asking patients whether they have any mucus in their stools, and upon receiving an answer in the affirmative at once presume the existence of muco-membranous colitis. A warning must be issued that patients have a great tendency to exaggerate the quantity of mucus they are passing, and it is as well to insist upon a definite estimate of the amount. “Colitis” is fashionable; there is hardly anyone who does not know a friend who has been through a cure at Plombières, Châtel Guyon, or in Switzerland. A little mucus is of no consequence, as it is frequently passed with any constipated stool. It is also necessary to be on the look out to distinguish various substances in the

¹ Mathieu and Roux, *Pathologie Gastro-intestinale*.

stools which are sometimes diagnosed by the laity as mucus; *e.g.* the proglottides of tape-worms, shreds of meat, fascia, tendons, and even curds of milk!

The identification of mucus in the stools is sometimes easy, sometimes extremely difficult. The best method of finding whether mucus is mixed with the stools is to take a portion of fæces, macerate it in water with a spatula, put it on a Petri dish, and examine it against a black ground, against a white ground, and by transmitted light.

One notes:

1. The consistency. This may vary from the fluidity of white of egg to the solidity of a dense membrane. 2. The colour. It may be stained yellow or green by bile, brown by fæces, and reddish by blood.

It is possible easily to mistake for mucus, vegetable grains, residues of potato and of tapioca. From these it is distinguishable by the fact that mucus is extensible by traction, whilst the vegetable substances are not; also mucus is stained violet red by thionine and green by Ehrlich's triacid stain.

When mucus occurs in sheets it may be confounded with meat residues or connective tissue. It may be distinguished by placing it in an incubator with some artificial gastric juice, when the meat will be dissolved but the mucus will

remain unchanged. (The artificial gastric juice is a mixture containing one per cent. of pepsin and three-tenths per cent. of hydrochloric acid.)

The character of the mucus may give important information as to the site of the morbid process in the intestine.

In catarrh of the rectum, sigmoid and descending colon, solid balls of fæces may be passed covered with mucus. In many cases, however, a considerable amount of mucus unmixed with fæces may appear.

Catarrh of the upper part of the colon will exhibit hyaline microscopic lumps of mucus intimately mixed with fæces. *No mucus can be seen with the naked eye.*

Catarrh of the whole of the large intestine is accompanied by mucus intimately mixed with the fæces as above, *but mucus can be seen with the naked eye.*

When the small intestine only is involved, the mucus is intimately mixed with the stools and *is not visible to the naked eye.*

“*Intestinal Sand.*”—This name has been given to a gritty residue which is often present in the stools in chronic colitis. It is chiefly of importance as tending to show the possibility of the colitis being of uric acid origin, and from this point of view the term “intestinal lithiasis” has actually been employed by some writers. The

best account on the subject is to be found in an article by Sir Dyce Duckworth and Archibald Garrod.¹ They give the composition of intestinal sand as—

Water, 12·4 per cent.

Organic material, 26·29 per cent.

Inorganic material, 61·31 per cent.

There is relatively a large proportion of lime salts. The composition, they point out, precludes a biliary origin; there is no cholesterin, and only traces of bile pigment can be found. The richness in urobilin and poverty in unaltered bile pigments suggests its formation in a region in which the conversion of the bile pigment into urobilin is already well advanced, and there is good reason to suppose the principal region of this change is the upper part of the colon.

Bedford,² in an article, describes a case occurring in a gouty woman. He thinks this condition is closely associated with gout, and may be regarded as allied to tophaceous deposits elsewhere in the body.

The quantity passed is very variable. Mummery³ states that as much as two ounces were passed by one of his patients in twenty-four hours.

Concretions produced in the intestinal canal

¹ Duckworth and Garrod, *Lancet*, March 8, 1902.

² Bedford, *ibid.*, July 26, 1902.

³ Mummery, *op. cit.*, p. 28.

may be divided into two groups—those formed round a small foreign body which has passed through the stomach, and those which appear to be the result of a lithogenous catarrh of the intestinal mucosa. It is to the latter group to which the term “intestinal sand” may properly be applied; and although at present its existence or absence does not offer any assistance—save the indication to treat the case from the standpoint of a uric acid diathesis—it may be that improved methods of investigation may throw more light on the subject, and may offer valuable indications as to the kind of treatment that is required according to its presence or not.

A word of warning is necessary in this connection. “Intestinal sand” is far more often diagnosed from a casual examination of the stools than is justified. The stone cells from fruits and other vegetable particles are sometimes present in considerable quantity, and their appearance very closely resembles that of concretions; true intestinal sand has no vegetable basis. Less frequently, concretions of a fatty or soapy nature may suggest “intestinal sand.” In the majority of cases a microscopical examination clears up the diagnosis, since the appearance of such vegetable débris is too characteristic to be mistaken. In the case of fatty concretions, microscopical examination is supplemented by testing with osmic acid.

(b) **Excess of Inorganic Ash.**—If a sample of stools be evaporated to dryness, each 100 grammes should contain 10 to 15 grammes of inorganic ash. The amount of inorganic ash is increased in catarrhal inflammation of the intestines and this increase is greater the nearer the lesion is to the anus. A large excess of inorganic ash over the normal renders the diagnosis of chronic colitis practically certain.

(c) **The Presence of Dissolved Albumin in the Stools.**—This is one of the most important of the modern tests, as it enables one to say definitely whether a diarrhoea has a purely functional origin such as nervous diarrhoea, or is the result of the irritation of undigested food, or whether it depends upon an actual inflammatory condition of the intestinal mucosa. It is also useful in the diagnosis of chronic inflammatory conditions, in which, although the stools are softer than normal, there is no actual diarrhoea.

The method of Tsuchiya¹ is quite easy and practicable in ordinary daily routine and is, moreover, more rapid than the other better known tests.

5 c.c. of the fæces (a piece about as large as a pigeon's egg, or double that quantity if it is liquid) is ground up in a mortar with a little water to form a mixture with the consistency of

¹ Tsuchiya, *Zeitschr. für exp. Pathologie u. Therapie*, t. v., 1908.

syrup. To 20 c.c. of the liquid a certain quantity of alcohol is added containing acetic acid to precipitate the nucleo-albumins. The precise amount to be added is ascertained by testing the reaction of the mixture with litmus paper. If strongly acid, 0.5 c.c. is added; if slightly acid or neutral, 1 c.c.; if alkaline, 1.5 c.c.; if strongly alkaline, 2 to 2.5 c.c. The composition of the acid alcohol is glacial acetic acid 10, 96 per cent. alcohol, 90. When the acid alcohol has been thoroughly mixed with the stools, 5 c.c. of chloroform are added and the mixture is again well stirred. The whole is now poured into a test-tube, where it will separate into two layers. The upper layer is decanted into another tube and a disc of copper agar added. After an hour the disc is thrown out, washed in water, and examined on a piece of white paper or a porcelain capsule. If the faecal extract is rich in albumin, the disc retains its blue colour. If albumins are absent or only traces are present, the disc will turn a bluish brown. A drop of solution of caustic potash or soda is then poured upon the disc, and a marked biuret reaction occurs at the edges of the disc if dissolved albumin be present.

The discs of copper agar are made as follows: Dissolve by heat 2 gm. agar in 100 c.c. water, add 10 c.c. of a 1 in 10 solution of copper sulphate in distilled water. Fill some glass tubes with

the mixture, cork the ends, and allow to cool; the copper agar will have solidified inside the tubes. The ends of the glass tubes should be covered with rubber caps to keep the agar soft. When required for use, push out a quarter of an inch of the agar with a round stick which fits the bore of the tube and cut off flush. As many discs as are required may be thus obtained.

H. INVESTIGATION FOR EVIDENCE OF ABNORMAL PUTREFACTION IN THE INTESTINE

(a) **Alkaline Reaction to Litmus Paper.**—Normal stools are amphoteric in reaction. When there is amylaceous fermentation in the intestine the reaction becomes acid. An alkaline reaction points to putrefactive changes due to proteolytic bacteria.

(b) **The Character of the Fields in Stained Preparations of the Stools.**—In preparations stained with Gram and counterstained with fuchsin or with neutral red, the red-stained organisms will normally preponderate (the colon bacillus being Gram negative). In abnormal putrefaction, in proportion as the aërobes are replaced by strict anaërobes (most of which are Gram positive), the blue-stained organisms will be in excess. It is therefore possible after a little practice to tell

by a glance at a film whether the intestinal flora is normal or not.

This was first pointed out by Strasburger,¹ who found the Gram negative bacteria in the stools of healthy adults to preponderate, especially when the diet was largely vegetarian. *Per contra*, he found the number of Gram positive organisms to be greatly increased when the patient was upon a meat diet.

This point has been further investigated by Herter,² who lays stress upon the valuable information which one may gain by the examination of Gram-stained preparations of stools. To quote his words :

“From the use of the Gram method one obtains some idea as to the numbers of micro-organisms resembling the colon bacillus in morphology: one may form a judgment as to the state of their preservation, as to the presence or absence of slender, long, Gram negative organisms of the type of the *B. liquefaciens ilei*; a judgment may be formed as to the numbers of Gram positive diplococci and other coccal forms.”

Herter also recommends the routine microscopic examination of the sediment in fermentation tubes which have been inoculated with the mixed faecal flora :

¹ Strasburger, *Zeitschrift für klin. Med.*, 1902, vol. xlv. p. 513.

² Herter, *Bacterial Infections of the Digestive Tract*, 1907, p. 131.

“The appearance of the Gram-stained flora gives as a rule an indication of the flora dominant in the lower part of the intestine. In tubes inoculated from normal persons, Gram negative organisms corresponding in size and form to bacteria of the *B. coli* type grow abundantly in all the tubes. As a rule they constitute the dominant flora in all the sediments.”

The important studies upon the fæces of healthy men lately carried out in the laboratory of the University of Illinois by Ward, MacNeal, Katzer, and Kerr¹ have placed our knowledge of the relative frequency of Gram positive and Gram negative bacteria in the fæces upon a more exact basis. The observations, 266 in number, were made upon the stools of twelve healthy men who were being fed upon a carefully selected representative mixed diet. The conclusions arrived at were as follows: “The Gram-stained films were always predominantly Gram negative. The total Gram bacteria, not including spores, varied between 97 per cent. in Subject J, February 27, and 63·4 per cent. in Subject G, March 4. The total Gram positive bacteria, including those containing spores, varied from 34 per cent. in Subject C, July 27, to 1·4 per cent. in Subject J, February 27. *Summary.*—The bacteria of the adult human fæces

¹ “The Fæcal Bacteria of Healthy Men,” *The Journal of Infectious Diseases*, vol. vi, p. 124.

are Gram negative for the most part, about 70 per cent. of all the bacteria being Gram negative bacilli. Gram positive rods are constantly present."

(c) **The Growth of the mixed Fæcal Flora in Sterile Milk.**—A loopful of a 1 in 100 suspension of fæces is introduced into a tube of sterile milk and placed in an incubator. A rapid breaking up of the curd formed by the gas evolved will point to the presence of abnormal organisms such as the *B. aërogenes capsulatus*.

(d) **Gas Production in Fermentation Tubes containing Sugar Bouillon.**—The amount of gas produced by the mixed flora of healthy fæces is, roughly speaking, from 15 to 39 per cent. of the height of the anaërobic limb.¹ The gas formation is diminished in most putrefactive conditions in the intestine, and points to a profound alteration in the flora.

Herter² states that in cases of well-marked examples of saccharobutyric fermentation, the quantity of gas produced may be one-half, one-quarter, or even one-fifth of the normal gas production. He is inclined to attribute this to a more or less complete elimination of the colon bacilli, or to their alteration in type. When making fermentation tests, the diet of the patient must be taken into account; as on a carbohydrate

¹ Herter, *op. cit.*, p. 126.

² *Ibid.*, p. 145.

diet the amount of gas produced is much greater than when the food consists chiefly of animal substances. Whenever the gas production is very largely increased we should first of all think of the possibility of yeasts being present. The most convenient form of fermentation tube for this purpose is similar to a Doremus ureometer. In our opinion it is better than the Durham tube in common use in English laboratories, as one is enabled to extract the sediment much more easily for microscopical examination. (The capacity of the tubes we use is 20 c.c., and they are specially manufactured by Griffin (Kingsway), not being a stock pattern in this country.)

(e) Schmidt's Mercuric Chloride Reaction.

—This test is performed by grinding up a little fæces with water, placing it in a beaker, pouring into it enough concentrated solution of mercuric chloride to cover it, and letting it stand until the next day. A normal reaction is a red colour imparted to the fæces. Schmidt says,¹ "The normal fæces is coloured red, and the more intensively the fresher and less decomposed the excrement is."

This coloration is much more striking in the fæces of patients who have just returned from undergoing a "cure" at Carlsbad or Châtel

¹ Schmidt, *The Test-diet in Intestinal Disease*, translated by Aaron. Philadelphia, 1906, p. 23.

Guyon (Kolbe).¹ In these cases the faecal material on coming into contact with the reagent instantly takes a beautiful rose colour. The test can also be performed by dropping a little powdered corrosive sublimate into the dish containing the faeces. Wherever the powder touches the stools, little spots of a rose colour appear. This red coloration of the normal adult stool is due to hydrobilirubin, and the fresher the stools are the more marked is the reaction.

Small particles coloured green are pathological and point to the presence of unaltered bile pigment (bilirubin).

(f) Strasburger's Fermentation Test.—

This is to be performed by placing a small quantity of faeces in the lower vessel of a Strasburger's fermentation tube,² filling the closed upper tube with water and putting the apparatus together.

It is then placed in the incubator for twenty-four hours. If the stools are normal very little gas is formed, and the reaction of the material remains unchanged. According to Schmidt,³ "If gas is developed to such an amount that one-third or more of the ascension pipe is filled with water, then pathologic conditions are involved,

¹ Kolbe, *op. cit.*, p. 26.

² To be obtained from C. Gerhardt, Utensienlager, Bornheimerstr., Bonn.

³ Schmidt, *op. cit.*, p. 24.

and if at the same time the reaction has become distinctly more acid, carbohydrate fermentation has occurred; if it has become distinctly more alkaline, albumin putrefaction has occurred." Gaultier,¹ on the other hand, uses this method as a rough test of the amount of undigested carbohydrate material in the fæces, the amount varying directly as the quantity of gas evolved.

The following conclusions are taken from Kolbe,² who has devoted considerable study to the subject:—

"Whenever enough gas is developed to fill half or more of the tube the condition is pathological; there is either putrefaction or fermentation or both. Fermentation of hydrocarbons will show itself by an acid reaction of the mixture of fæces in the bottle) after the test has been completed. (Of course provided that, at the outset, the reaction was amphoteric.) A well-marked alkaline reaction points to putrefaction of albumins. In the first case the opened bottle will exhale an odour of butyric acid; in the latter an intensely foetid one. (The test is, of course, superfluous when fermentation is self-evident from the macroscopic appearance of the stools, which are foamy, light-coloured, acid in reaction, and with a sour smell.) In certain cases both fermentation and putrefaction may

¹ R. Gaultier, *Coprologie Clinique*, p. 79.

² Kolbe, *Examen fonctionnel de l'intestin dans la pratique journalière*, p. 27.

have occurred, and as their effects tend to a certain extent to neutralise each other the stools may present no marked changes either in colour or in reaction."

(g) **The Estimation of the Relative Proportion of Aërobic and Anaërobic Bacteria in the Fæcal Flora by Cultural Methods.**—Whilst from the direct examination of Gram-stained smears we can form some rough idea as to which preponderates, the fallacies and possible errors are many. The method of counting may also be placed out of court as prohibitive in general practice on account of the time which it occupies. Fortunately, the following easy process will answer our requirements as far as clinical work is concerned. We take a series of tubes of agar containing the appropriate nutrient material and inoculate them with the diluted fæces in the usual manner, we then plunge them into cold water and thus cause the agar to solidify quickly. In each tube the cylinder of agar will be divided into three zones: an upper zone about 2 centimetres in depth which has absorbed air during cooling, a deep zone entirely free from oxygen, and an intermediate one. If these tubes are now incubated we shall find that the strict aërobes will develop in the upper zone, the facultative anaërobes in the middle, and the strict anaërobes in the lowest. A further distinction can be made be-

tween the facultative and strict anaërobes by the time of appearance of the colonies, the former appearing as a rule in twenty-four to twenty-eight hours, the latter much later.

(h) **The Examination of the Urine.**—

An appropriate examination of the urine will in most cases supply some valuable data of diagnostic importance, sometimes confirmatory, sometimes contradictory of the opinion which we have formed as the result of our other investigations.

In the first place we may obtain strong confirmation of intestinal putrefaction.

1. Signs of auto-intoxication from the intestine.

The signs by which we may know that abnormal putrefaction is taking place in the intestine are the following :—

The Rise in the Ethereal Sulphates.—This will cause an alteration in the coefficients of Baumann-Morax and of Amann, which, together with that of Combe, are accepted by the French school as being distinctive of auto-intoxication from the intestine. The coefficient of Baumann-Morax is the ratio between the sulphuric acid of the ethereal sulphates and the normal sulphuric acid of the sulphates in the urine. This, as a rule, varies from 8 to 20 per cent., but with the rise of the ethereal sulphates may be much higher. The coefficient

of Amann is the ratio between the sulphuric acid of the ethereal sulphates and the total nitrogen, and should normally lie between 1·4 and 1·6 per cent.

The following is a comparatively simple method of estimating the ethereal sulphates. Place in a flask 50 c.c. urine plus 5 c.c. HCL plus 10 c.c. solution of barium (30·5 gm. chloride of barium to the litre). Heat the mixture for 15 minutes over a naked flame; filter, wash, dry, calcine and weigh the precipitate. Result (A)=total sulphuric acid. Into a flask put 50 c.c. urine plus 5 c.c. acetic acid plus 10 c.c. of the barium solution. Heat gently; filter, wash, dry, calcine and weigh precipitate. Result (B)=the sulphuric acid of the neutral sulphates. $A - B \times 6.8692$ = the quantity in milligrammes of ethereal sulphates contained in a litre of urine.

The Increase in the Total Amount of Aromatic Bodies present in the Urine.—This is used in practice to calculate the coefficient of Combe,¹ which is the number of milligrammes of aromatic bodies which the urine contains for each 100 grammes of total nitrogen. Normally this varies from 200 to 300 in the case of children, and from 300 to 350 in adults. In auto-intoxication from the intestine it may reach a much higher figure.

The Rise in the Capillary Constant.—It has been

¹ Combe, *op. cit.*, p. 258.

claimed by Amann¹ that the capillary constant gives us a rough but satisfactory measure of the amount of aromatic substances in the urine. It has been discovered experimentally that the surface tension of the urine is lowered by the presence of uric acid, hippuric acid, and the aromatic bodies. We may, therefore, within certain limits and with some reservations, take the amount of lowering of the surface tension as a measure of the amount present of the bodies which produce auto-intoxication.

We may measure the surface tension with a special form of stalagmometer² which Amann has devised, or we can extemporise one in the following manner. Take an ordinary burette with a stopcock, and attach to its tip half an inch of capillary tube by means of a little piece of rubber tubing. Fill the burette up to the zero mark with distilled water, turn on the tap, and commence to count the drops which fall from the capillary orifice. When exactly 100 drops have fallen, note the volume of water which has been expelled. Mark this spot on the burette with a diamond. You have now an apparatus with which you can estimate the surface tension of urine. The burette is filled with urine up to the zero mark, and the number of drops which fall until the level of the

¹ Combe, *op. cit.*, p. 287.

² To be procured from C. S. Penfold, 6 Rue de Candolle, Geneva.

urine reaches the mark are counted. The number of drops of urine, minus 100, divided by the difference between the specific gravity of the urine under examination and 1000, will give a quotient which is termed the capillary constant and bears a fixed relation to the superficial tension.

An example will make this plain. Suppose we take urine of a specific gravity of 1020, and 110 drops fall before the level of the urine in the burette reaches the mark, then the capillary constant will be obtained by the following formula:—

$$\text{Capillary constant} = \frac{110 - 100}{1020 - 1000} = \frac{10}{20} = 0.5.$$

This is the capillary constant of normal urine.

In intestinal auto-intoxication the capillary constant is as a rule raised. In cases we have observed, it has reached 0.9, 1.0, or even in one case, 1.6.

Pronounced Indicanuria.—The easiest test for indican in the urine is that with Obermeyer's reagent which avoids the risk of excessive oxidation, which is the chief defect in Jaffé's reaction. Add to the urine one-fifth its volume of a 20 per cent. solution of acetate of lead and filter. To the filtrate add an equal amount of Obermeyer's solution (fuming concentrated HCL containing 4 grammes of ferric chloride to the litre). When the test is positive either indigo blue or indigo red is formed.

A very good method of indicating the presence of indol or skatol is that devised by Amann.¹

To 50 c.c. of filtered urine add 5 minims of saturated aqueous solution of persulphate of sodium, 10 c.c. of benzene, and 300 c.c. of dilute sulphuric acid (1 in 2). Cork the tube and invert it several times. Repeat the shaking after a quarter of an hour, then keep it at rest until the benzene has risen to the top.

(a) The benzene is colourless. This denotes absence of indol and skatol.

(b) Blue. Indigo only.

(c) Violet. Indigo blue plus indigo red or skatol.

(d) Rose. Indigo red plus skatol.

The Presence of Phenols.—These bodies in the urine may be recognised in the following manner: Add, very gradually, to the urine to be examined 5 per cent. of its volume of sulphuric acid and distil. Neutralise the distillate with pure sodium carbonate and redistil. This distillate will show the following reactions if phenols are present:—

(a) With bromine water, a yellowish white precipitate (of tribromphenol) soluble in sodium hydrate and reprecipitated by hydrochloric acid.

(b) A red colour on heating with Millon's reagent.

(c) A violet colour with perchloride of iron.

¹ Combe, *op. cit.*, p. 268.

(d) A blue colour if gently warmed with a dilute solution of a hypochlorite.

The Presence of Aromatic Oxyacids.—According to Herter, both paraoxyphenylacetic and oxyphenylpropionic acids are occasionally present in the urine, even in cases in which there is an absence of urinary phenols. When present alone, they give a reaction with Millon's reagent in the cold. When both aromatic oxyacids and phenols are present in the urine, the reaction with Millon's reagent will be obtained after the phenols have been distilled off.

The most accurate methods for estimating the amount of aromatic bodies in the urine are unfortunately only possible with the resources of a properly equipped laboratory. For indol and skatol, a chloroformic solution must be evaporated and the residue purified and weighed. In the case of the phenols the methods of Kossel and Penny may be used.¹

For ordinary clinical work we must content ourselves with estimating the aromatic bodies chlorometrically, obtaining of course only approximate results. The simplest and cheapest apparatus for this purpose at present obtainable in this country is the Dimmock-Branson chrometer, which is not as well known as it deserves to be.

Having established the existence of intestinal

¹ Kossel and Penny, *Ziet. f. Phys.*, ch. xvii. p. 117.

auto-intoxication we should attempt, before relinquishing the examination of the urine, to ascertain whether this is due to diminution in the protective power of the liver, to increase in intestinal fermentation, or to both.

We are not able to test directly the antitoxic power of the liver, but we can infer it by observing the efficiency of its other work. It has been demonstrated by Roger that the glycogenic function of the liver and the power of the hepatic parenchyma to arrest intestinal poisons increase and diminish *pari passu*. It has been proposed to give a dose of 150 grammes of glucose and afterwards to test the urine for sugar. Its appearance would be a proof of hepatic non-efficiency. This test and that of the intermittent elimination of methylene blue are yet in the experimental stage, and we must at present rely upon the two following tests:—

Ratio of Urea to the Total Nitrogen.—A deficiency of urea in the urine is not of necessity a sign of hepatic inefficiency unless we know at the same time that the intake of nitrogen is normal. This knowledge is impossible in daily practice, and we overcome the difficulty by taking the ratio of total urea nitrogen to the total urinary nitrogen. When the urea nitrogen is less than 83 per cent. of the total urinary nitrogen, we may presume hepatic insufficiency.

Ratio of Ammonia to total Urinary Nitrogen.—

With the exception of a negligibly small amount, the ammonia formed during digestion in the intestines is converted by the liver into urea. A ratio greater than 5 : 100 will denote hepatic inefficiency.

Presence of Leucine.—Leucine is changed by the hepatic cells into urea. The presence of more than a mere trace in the urine will denote hepatic inefficiency.

2. Confirmation of functional derangement of the pancreas.

The Cammidge C reaction was introduced a few years ago, and it was claimed for it that it could be obtained in nearly all cases of chronic colitis. In the hands of Dr. Cammidge and Mr. Mayo Robson the results which were obtained certainly appeared to be trustworthy. Other observers, however, have thrown doubt upon the reliability of the results, and at the present day it is regarded mainly as a confirmatory evidence of the presence of chronic pancreatitis which has been ascertained by other methods. It is a complicated and rather difficult test, so that it is quite possible that the unsatisfactory results obtained may in some cases have been due to the imperfect technique of the operators, who have not carried out the test with the attention to detail insured by the inventor. Oxalate of calcium crystals when present in the urine are, according to Cammidge and Robson,

strongly confirmatory of chronic pancreatitis; they were found in 73 per cent. of all cases they examined.

3. Identification of any organism in the intestinal flora which may bear a causal relationship to the intestinal affection.

Whenever stools are required for cultural experiments it is unsatisfactory to use those which have been passed by the patient as they are invariably contaminated with bacteria from the skin round the anus. The proper technique is that introduced by Booker,¹ which consists in collecting the stools from the upper part of the rectum. He introduces through the rectum a sterilised glass tube into which a smaller sterilised glass tube, provided with a rubber teat, is passed and some fæces aspirated into the latter, to be subsequently emptied into a sterile test tube containing normal salt solution.

Our own technique is rather different. We first of all pass a short sigmoidoscope. Through this we pass a glass tube into the fæces which we shall find in the upper part of the rectum. The tube when withdrawn is placed just as it is in a long sterile test tube provided with a cotton wool plug, and the whole is sent as soon as possible to the bacteriologist.

The most experienced physician, even a speci-

¹ Booker, *Johns Hopkins Hospital Reports*, vol. vi., 1896.

alist upon diseases of digestion, cannot be in a position after asking a few questions to do more than hazard an opinion as to the nature of the complaint from which the patient suffers; an opinion possibly correct but only a guess. The patient cannot appreciate this and will often demand why, if a diagnosis of a disease of the lungs or heart can be made at once in the consulting-room, that of some digestive disturbance should be in a different category and require further investigation.

It will not be easy to persuade the patient wherein the difference lies, but an attempt at least is advisable, for a reasonable patient will often see the justice of the physician's requests. It should be explained that in the case of practically all the other systems an opportunity is afforded to ascertain the efficiency of their work and identify any imperfections by the ordinary means of examination. The gastro-enterologist, on the other hand, is usually asked to be satisfied with symptoms alone, and the abdominal organs afford *par excellence* a fine field for the elaboration of a vast number of queer subjective sensations corresponding to nothing definite, so that the information offered will generally prove not only useless but misleading. It will be seen, therefore, that the gastro-enterologist demands after all only equality of opportunity. He cannot see the abdominal organs at work without the means of interrupting the process at a definite

stage, as by the extraction of a test meal or by the examination of the waste products of their activity, in order to achieve which the apparently elaborate scheme which has been unfolded in detail in the preceding pages is indispensable.

PART II
TREATMENT

PART II

TREATMENT

It cannot be unduly emphasised that, in the treatment of so complex a disease as chronic colitis, the essential factor is the consideration of features special to each individual case, to which end it is necessary to formulate a well thought out scheme.

It is a mere platitude to insist that some medical men cure their patients and others for some reason fail to do so. It is equally true, although not so thoroughly realised by the layman, that this difference is often largely due to the patient himself, who will not give facilities for the best treatment and has to rest content with the second or third best. The patient often says, in effect, "I have had this trouble for fifteen years, and I expect you to cure me in two or three weeks without putting me to bed, or interfering with my habits or pursuits, or cutting me off the articles of diet which I especially like (and which probably are responsible for the complaint); and, above all, I stipulate that any treatment which you prescribe must not require skilled supervision but must be one which I can carry out myself."

Of course he is asking you to perform a miracle, and he very often refuses the whole or part of the treatment suggested because it does not conform to the stipulations he has laid down, not in so many words, perhaps, but in his mind.

In many cases in which the patient is quite willing to play his part in the cure the fault is on the side of the medical man, who, being unable to look at the case from a sufficiently broad standpoint and make a plan of campaign, is content to treat symptoms as they arise; which, to continue the simile, is simply a close attention to small skirmishes which do not affect the main issue at all.

We think that we shall render this section of the book most useful to the junior practitioner for whom it is intended, by enumerating in succession the different indications for treatment which may be present, and discussing the appropriate means by which they may be met.

It is probable that only some of these indications will be present in any given case. To formulate the scheme of treatment one runs through them all and decides which of them are present and the best way of meeting them in the particular patient.

A. THE REMOVAL OF A POSSIBLE CAUSE

It is of course obvious that, if we can discover a probable or even a possible cause for the complaint, its removal is our first duty, and the rest of the treatment will consist in eliminating the results that have been the consequence of such a cause.

Of all the causes of chronic colitis the commonest is universally admitted to be some focus of chronic pus infection somewhere in the gastrointestinal tract. This has already been fully discussed in the chapter upon ætiology, and it is only necessary to repeat as a convenient reference the particular sources of infection that enter into consideration.

1. The food which enters the intestine is irritating or infected.

(a) *Pyorrhœa alveolaris*.—This, as we have already seen, is undoubtedly the commonest source of infection by pus organisms and must be effectually treated by the dentist before serious treatment of the colitis is commenced. Dental treatment need not involve wholesale extractions, as, if the patient can be persuaded to give sufficient time and attention, most cases can be made quite well by the intelligent manipulation of peroxide of hydrogen used with cotton wool and Colyer's

broches, and the systematic use of an efficient tooth-paste.

Defective mastication must of course be improved by artificial teeth.

(b) *Chronic Disease of the Nose and Post Nasal Space*.—This is also an extremely common source of infection of the stomach by pus organisms. It is present in a very large proportion of individuals who live in cities and are continually inhaling infected dust from the roads. When therefore there is any affection with a nasal discharge accompanying chronic catarrh, hypertrophy of turbinates, polypi or ethmoidal diseases, this must first of all be adequately treated by a specialist before any serious attempt is made to cure the intestinal condition, otherwise complete failure or a temporary partial success followed by a relapse is inevitable.

(c) *Deficiency in the Hydrochloric Acid content of the Gastric Juice*.—This is probably an invariable factor in all cases in which the two sources of infection mentioned have produced colitis. It may be assumed or directly ascertained by the appropriate test (*vide* p. 84). One of the chief functions of the hydrochloric acid of the gastric juice is to destroy bacteria, and when it is deficient one of the chief defences of the organism is lost and the chyme which passes into the duodenum is infected.

The obvious treatment is the administration of hydrochloric acid in fairly large doses during or after a meal.

(d) *Fermentation in the Stomach*.—This will also result in the passage of infected chyme through the pylorus. Its cause is usually some interference with the motility of the stomach, which results in food remaining far longer than is normal in the stomach. It may be variously caused by atony, spasm or stenosis of the pylorus, gastropotosis or enteroptosis. (The treatment for these conditions hardly comes within the scope of the present volume; it will be found detailed in another work by one of us.¹) We would, however, mention that, as symptomatic treatment, the effect of an antiseptic acting within the stomach should be tried; and in cases not benefited in this way daily lavage of the stomach should be prescribed and the patient taught to perform this operation himself.

When there is well-marked ptosis, a proper support should be applied to the lower abdomen, which, in the case of men, may be in the form of a fitted belt permanently attached to the top of the pants, and in the case of a woman, one of the modern corsets which do not compress the waist but lace up from below on the two sides.

¹ *Indigestion*. By George Herschell, M.D. London, Glissher, 3rd edition, chapter iv.

Combe¹ lays stress upon the use of menthol and thioform or ichthyol given to control the fermentative processes in the stomach, to which reference will again be made in the section devoted to disinfection of the intestines.

2. The food which enters the duodenum is normal, but intestinal digestion is defective and its products are irritating by the time they reach the colon.

Deficiency in the Pancreatic and Biliary Secretions.—This may arise in several ways.

The chyme entering the duodenum may not contain sufficient hydrochloric acid to effect the normal change of prosecretin into secretin.

The formation of prosecretin in the intestinal mucosa may be defective.

The pancreas may be diseased so as not to respond to the stimulus of the secretin. In such cases the indication is to give some pancreatic preparation, such as pancreatin or pancreon, well guarded so as to pass without change through the stomach. If there is hypochlorhydria we can give the pancreatic preparation either alone or preferably accompanied by a little bicarbonate of soda. If the gastric juice is normal as regards hydrochloric acid, we may wait until the secretion is complete, and after all the chyme has passed the pylorus and the stomach contents are neutral, give the dose of

¹ Combe, *op. cit.*, p. 495.

pancreatin with soda as a protective. As another form of protection, we may give the pancreatin in capsules coated with keratin, whereby they pass unchanged through the stomach but dissolve in the alkaline intestinal contents. Alternatively, we may administer prosecretin (now an article of commerce), which will be converted into secretin proper by the hydrochloric acid with which it will come in contact.

B. THE REGULATION OF THE DIET

Everyone admits that the logical treatment of any gastro-intestinal disease should commence with dietetic measures.

The diverging views which have been held as to the etiology of chronic colitis are quite sufficient to account for the very large number of different dietetic régimes which have been elaborated. Nevertheless, one would hardly have been prepared for the remarkable fashion in which the régimes not only differ from each other, but, as will be seen below, in many cases contain certain features which, when compared *inter se*, present actual contradictions. In appending therefore, a résumé of the various régimes which have been suggested in the past and which are adopted at the present day, we do so for the sake of completeness and not with the idea of

even suggesting their use by any reader of this book. For it is perfectly certain that any strict inelastic régime which is imposed upon every patient irrespective of the particular characteristics of his condition and regardless of his idiosyncrasies—personal, racial, digestive or otherwise—must necessarily prove unsuccessful when not carried out by the originator himself (or by one who has been personally trained in his methods) and divorced from the special climatic advantages which seem often to be a vital requirement.

They are principally of value from an educational and academic point of view, as showing us how the authorities attempted to apply to actual practice the theories, mostly erroneous, which they held as to the nature of the disease.

Leube's¹ scheme is probably the oldest of all advised. It is natural that as a gastric authority he should pay especial attention to the stomach rather than to the bowel. His diet sheet is well known and is a graduated scale of digestibility, the articles of food being added one by one in the following order: Bouillon, meat juice, milk, eggs, raw or boiled, brains, sweetbread, boiled chicken, pigeon, calves' feet, underdone beef steak, raw ham, roast meat, and finally game. As a beverage he permits only plain and sparkling mineral water.

¹ "Diseases of the Stomach," by Riegel, in *Nothnagel's System*. Philadelphia, 1903.

These are arranged in a series of groups, and the number of days is specified before advance to successive groups may be undertaken.

Bouchard's restrictions and enjoinders are obviously inspired by the idea of dilatation of the stomach, a condition which always dominated his clinical horizon. He advises a long interval between meals, and emphasises the importance of slow eating and thorough mastication. He allows cold meat, hot braised meat, boiled fish, purée of meat, pâtes alimentaires, cooked creams, rice cooked in milk, purée of vegetables, boiled eggs, compôte of fruits. He particularly prohibits red wine.

Dujardin-Beaumetz qualifies his regimen according to whether constipation or diarrhœa predominates. If the former, his diet is almost identical with that of Bouchard. If there is diarrhœa, he gives a vegetarian dietary composed of starchy vegetables and forbids meat and eggs. He also forbids beer at meal times.

Einhorn's¹ scheme is also influenced by the existence of diarrhœa or constipation, but the details of the articles allowed and forbidden are much more elaborated. When diarrhœa is present, he forbids acid or sweet wines, salads, rye bread, cabbage, pastry. He allows eggs lightly cooked, lamb chops, oysters, fish, white

¹ Einhorn, *Diseases of Intestines*, p. 345. New York, 1800.

bread well baked or toasted, fresh butter, cream, soups, bouillon, rice, sago, macaroni, mashed or baked potatoes, milk, cocoa and tea. In cases in which constipation is a feature, he allows, in addition to the preceding, oranges, pears, grapes, green vegetables, green peas, cauliflower, large amounts of starchy food, butter and cream. Beer, ale, Rhenish wine are permitted in moderation.

Grandmaison¹ distinguishes two periods of treatment. During the first of these the diet is composed exclusively of potato, cereals, leguminous purées and pâtes alimentaires, soups made entirely with vegetable stock, and, instead of bread, potato cooked in water. At this stage it is as well to avoid biscuits or rusks. Hot drinks slightly sweetened are allowed at meals but no tea or coffee. [The hot drinks allowed would be the infusions of tilleul, camomile, mint, &c.—**AUTHORS.**]

Second period. At the end of three weeks at earliest and if the pains and spasms are better, an attempt is made to combat the constipation and to leave off the large enemata which have been part of the routine during the period above referred to. Vegetables rich in cellulose and cooked fruits are therefore prescribed, and game, rabbit, or ham, and white cheese are permitted.

Bourget's régime.—On waking, the patient

¹ Dr. F. de Grandmaison, *Les Régimes*, p. 147. Paris, 1909.

should take a glass of hot water (or infusion of camomiles) with half a teaspoonful of Carlsbad salts, or, better still, two ounces of an alkaline water containing a special solution of sodium phosphate. He should then turn immediately on his face and lie prone for five minutes, after which, on resuming his position on his back, he exercises his abdominal muscles by flexing his thighs upon the abdomen—ten to twenty of such movements should be performed with each limb.

On their conclusion, the patient rises (at about 8 A.M.) and breakfasts, the meal consisting of weak tea with milk or cream, or cocoa, bread and butter, and fruits raw or stewed according to his capacity for digesting them. After a quarter of an hour's rest he begins his usual daily occupation.

Between 10 and 11 A.M. he takes a glass of Vichy or similar alkaline water, or preferably, when in season, such fruits as oranges, grapes, pears, and peaches.

Lunch is taken at 12 o'clock, and consists of bread (crust only), eggs, roast or grilled meat (never game), rice, potatoes in jackets or in purée form, a vegetable which is not cabbage, sorrel, rhubarb, nor tomatoes. Salad, however, is permitted dressed with oil, very little vinegar, plenty of salt, no pepper or mustard. For sweet, a milk pudding. No fruit. Red wine may be drunk but not coffee nor liqueur.

Rest for a half to one hour.

Between 4 and 5 o'clock a glass of Vichy water or weak tea with some fruit. At the evening meal, butcher's meat is, so far as possible, withheld, and fish or poultry is substituted. This meal should conveniently consist of a vegetable soup, eggs, fruit or milk pudding, and a cup of milky tea or lemonade.

Combe.—This régime differs from the preceding in that it is directly adapted to the treatment of the intestine. It is essentially lacto-farinaceous with a predominance of hydrocarbons, the object being to diminish intestinal putrefaction to the greatest possible extent.

The indications of treatment, says Combe,¹ are to modify the intestinal culture medium and evacuate the products of putrefaction of the large intestine. Intestinal antiseptics are useless; sterilised food might be a good adjuvant but the procedure is impracticable, since one cannot find something harmful to microbes yet harmless to man. In general terms, meat (especially if not perfectly fresh) increases intestinal putrefaction, and whether red or white no difference is noted; eggs are likewise to be condemned though to a lesser extent and since nitrogenous foods must be taken eggs should be selected. Fats increase putrefaction, butter and cream are the least bad offenders. As

¹ Combe, *L'Enterite*.

an anti-putrefying diet, a lacto-farinaceous one is the most suitable. Of the hydrocarbons, lactose is the best preventive of intestinal putrefaction, and its presence in fresh cheese renders this article of diet particularly excellent.

A little, that is to say a marked minority of farinaceous food in the diet is of no anti-putrefying value. A diet half meat, half farinaceous, notably diminishes the proportion of sulpho-ethers. The best result is obtained with as large an excess of farinaceous food as can be taken, and it should be spread over many meals in the day rather than in a few.

The liquids and solids in the diet should be separated as dry meals diminish intestinal putrefaction. An hour's rest (not sleep) should be taken after each meal.

The different foodstuffs have been arranged by Combe in a series of menus comprising—

1. Régime of soups. This consists of gruels and Evian water only.
2. Farinaceous diet without meat.
3. Lacto-farinaceous diet with meat.
4. Lacto-farinaceous diet with vegetables.
5. Full régime, the essentials of which are that it contains a minimum of meat and a maximum of farinaceous foods with purées of vegetables.

To this "full diet" are eventually added by

degrees, fresh vegetables not in purée form, cooked and fresh fruit.

Although this is the régime of Combe as set forth in his published works,¹ there is reason to think, from diet sheets actually delivered to patients whom we have seen, that his diet, whilst adhering to the main principles, has considerably altered in detail since their publication.

In his works, Combe reproduces and replies to the various objections which have been advanced against his farinaceous régime. To the charge that it is weakening, he replies, that although the ratio is diminished the quantity of accumulated nitrogen is not lowered because intestinal putrefaction is decreased. To the objection that the diet contains too small an amount of fluids and is therefore injurious to the kidneys, he answers, that the urine is actually increased in quantity because there is so much water in the food.

Jouast's² régime is preceded by the premise that the patient must be given sufficient food to maintain his normal equilibrium as well as to include the extra ration required for work. "The latter, it is well known, is double the former."

The principles, he continues, governing the ideal diet for a case of colitis are :

¹ Combe, *Traitement de l'Enterite ; L'Auto-intoxication*.

² Jouast, *Les Traitements des Enterites. Les actualités médicales*. Paris.

1. That it shall be sufficiently nutritious.

2. That it shall not subscribe to the formation and retention of indigestible residues, so that auto-intoxication is avoided.

3. That it shall not cause constipation, and will relieve constipation when present without at the same time disposing to diarrhoea.

The nitrogenous foodstuffs should be selected with special regard to reducing the strain upon the alimentary canal to the lowest practicable limit. Such foods, therefore, should be finely divided, contain little residue, and, above all, be perfectly fresh.

Meats.—Game is forbidden, as is also pork in all its forms except the lean of ham. Sauces, spices, and condiments of all kinds are avoided in the preparation of meat dishes, and stews, preserved and salted meats are forbidden.

Poultry is recommended, sweetbreads are desirable as the lightest and most easily digested form of aliment with high nitrogenous content.

Fish.—Salmon, eel, mackerel, and other fish whose meat is fatty, and all preserved fish are forbidden.

A lacto-vegetarian régime should form the basis of the dietary of most patients with enterocolitis. But the cereal vegetables which contain a large residue are avoided in favour of the starch-containing varieties, which are best taken

in purée form. Other vegetables, such as tomatoes, asparagus, spinach, Brussels sprouts, sorrel, are forbidden because of their indigestibility. For the same reason, vegetables cooked in butter are undesirable.

On the other hand, great benefit will be derived from chicory, lettuce, and cauliflower. Bananas, grapes, and peaches are the only raw fruits which are allowed, although the list may be extended if the fruits are stewed.

Bread should be taken as sparingly as possible and is advantageously replaced by biscuits.

The best form of fat is fresh butter.

Eggs are permitted in any form except when compounded in a mayonnaise sauce.

Milk may be taken between meals, either undiluted or with mineral water. If it is not well borne or is disliked it may be replaced by Kefir. Milk may also be made the basis of a number of vegetable milk soups of barley, peas, beans, lentils, &c.

Pastry and Confectionery of all kinds are forbidden. The best form of sweet is a rice pudding in which an egg may be included.

Cheese.—The only kind allowed is a perfectly fresh cream cheese.

Beverages.—Warm infusions at the end of a meal will often be found of service. Spring water and mineral waters, to which a little wine, pre-

ferably white, may occasionally be added, are also allowed. On the other hand, undiluted wine, so-called "digestives" which are rich in alcohol, acid beers, cider, coffee, tea, and all liquours are, without exception, barred. A final recommendation is the avoidance of iced drinks.

Harrogate.—The régime at Harrogate is as follows :—

Breakfast: Porridge made with barley one part, wheat one part, peas one part, and occasionally oatmeal one part. Poached white of egg. Stale bread and toast.

Lunch and dinner: Clear soup, chicken, fish, mince, boiled mutton, sweetbread, potatoes in jackets. Purée of peas, beans, or lentils. Rice, arrowroot, Iceland or Irish moss jelly, diluted milk.

Tendons, fibrous tissue, greens, and anything the stomach and intestine cannot easily digest, are avoided. If the liver is sluggish, half an ounce of Carlsbad salts in a glass of Plombières water is taken before each of the chief meals.

Absolute Milk Diet.—The results of this régime have been, without exception, bad. Many patients find milk utterly abhorrent, and many others to whom it is not distasteful cannot digest sufficient to preserve the nitrogenous equilibrium. In some patients it causes constipation and in others diarrhœa. The curds produced by its exclusive use are tenacious and irritating. In fact,

experience shows us that in the treatment of colitis, milk, without the admixture of farinaceous material, should be strictly forbidden.

Vegetarian Diet.—The absolute exclusion of flesh food may be indicated in the dietetic treatment of chronic colitis, but this is very far from recommending the ingestion of a large amount of vegetables and, *a fortiori*, the adoption of a strictly vegetarian régime. In fact, the addition of vegetables to the menu of the sufferers from chronic colitis should occur at quite a comparatively late stage in the treatment of the case. Vegetables contain a bulky indigestible residue which will unduly distend the bowel and irritate the hyper-sensitive intestinal mucosa. They contain also vegetable acids and other chemical peristaltic stimulants, thus initiating precisely that state of irritation which it is our object to avoid.

Meat Diet.—The so-called Salisbury diet has been tried by its enthusiastic adherents in chronic colitis, as in most other diseases, with results which varied with the affection from which the patient was in reality suffering. In ordinary colitis occurring as an evolutionary stage in the course of atonic constipation, the patient was, as a result, usually made worse. In colitis accompanied by alkaline stools and increase of putrefactive processes in the intestine, the patient became, as might be anticipated, very much worse. In cases

of intestinal fermentation associated with acid stools and increase of saccharolytic bacteria in the intestine, the patient usually exhibited a remarkable improvement for a time, as the first effect of the new milieu would be to starve out and so exterminate the germs which were causing the trouble. The patient often remained perfectly well if his medical man had the discrimination to stop the meat diet at the ideal moment and prescribe an ordinary mixed régime. If on the contrary, encouraged by the improvement he continued the meat diet, a condition of putrefaction with alkaline stools would be set up, and the last state of that patient would be worse than the first.

Von Noorden's diet is distinct from all the others we have examined, and is the only one of its type which we need seriously consider. Whatever the etiology or the pathology of the disease, he thinks a cure is attainable only by the relief of the constipation. He advocates, therefore, the use of a diet with a large indigestible residue and containing a great deal of fat. An essential feature is that this régime should be adopted suddenly and not by degrees, since the aggravation of the symptoms which its institution necessarily causes and for which rest in bed and the administration of belladonna are prescribed, more rapidly subsides in this way.

Conflicting reports are received as to the results of this diet; the reason for the discrepancies is very possibly to be found in the difference between English and Continental alimentary canals. Although a few English surgeons have reported good results with its use, we can unhesitatingly say that in our experience, better results are obtainable by the bland graduated régimes which we recommend. We have had no opportunity of observing any cases which have benefited by the treatment.

The following are Von Noorden's detailed directions for the treatment of an average case of "Membranous catarrh of the intestine," translated by Boardman Reed,¹ and given by him in his classical work on diseases of the stomach and intestines.

"At 7 a.m. in bed.—Three-tenths of a litre of milk and cream (two parts of milk and one part of thick sweet cream); then usually a rub with moderate cold water.

"At eight o'clock.—One quarter of a litre of Kissingen (Racoczy) or Homberg Elisabeth water.

"At nine o'clock.—Three-tenths of a litre of the milk-cream mixture, or weak tea or coffee with much cream; sometimes, too, cocoa prepared with cream or butter and sweetened with sugar of milk.

¹ Boardman Reed, *Lectures on Diseases of the Stomach and Intestines*, p. 816. London, 1905.

In addition, 50 to 70 grams ($1\frac{1}{2}$ to $2\frac{3}{4}$ oz.) of coarse bread containing much cellulose and 30 to 50 grams (1 to $1\frac{1}{2}$ oz.) of butter.

*“At 10.30.—*If necessary, massage of the abdomen, or hydrotherapeutic treatments of different kinds; sometimes electrical applications to the colon.

*“At eleven o'clock.—*Soup made from leguminous plants boiled with bacon or Westphalia sausages; in addition Graham bread with plenty of butter. Also a glass of breakfast wine or a small glass of brandy.

*“At 1 p.m.—*A meat dish, as much as is wanted. In addition, vegetables of different kinds, boiled or baked potato with butter. Fruits with coarse skin and large seeds, as currants, gooseberries, cranberries boiled, or a pound of grapes. One-half a bottle of light Moselle wine. At the termination of the meal rest in bed for an hour and a half with hot applications to the abdomen.

*“At four o'clock.—*A light lunch similar to the breakfast at nine o'clock.

*“At seven o'clock.—*Supper like the dinner at one o'clock; sometimes, too, junket or fruit soup. In addition, 50 to 70 grams ($1\frac{1}{2}$ to $2\frac{3}{4}$ oz.) of Graham bread with plenty of butter.

*“At nine o'clock.—*Three-tenths of a litre of the milk-cream mixture of the morning.

“On the first and third days of the treatment,

an oil clyster is usually given in the evening in order to prevent all disturbances which might possibly arise.

“The average quantity of cream consumed amounted in our cases to one-half a litre a day; this amount containing 150 grams ($4\frac{1}{4}$ oz.) of pure butter-fat. The average amount of butter equalled 230 grams ($7\frac{3}{4}$ oz.). The average quantity of Graham bread was 200 to 250 grams ($6\frac{3}{4}$ to 8 oz.). We usually give the bread sold by O. Rademan (Frankfurt-am-Main) under the trademark ‘D-K.’

“According to our experience mild disturbances occur under this régime. It is well to prepare the patients for this in advance. In order to counteract these disturbances it is a good plan to keep the patients in bed for the first few days; in addition hot compresses, or possibly suppositories of $\frac{3}{5}$ centigram ($\frac{1}{10}$ grain) of extract of belladonna, and the oil clysters mentioned above, may be given. (This on the first and third days of the treatment.) After the first two to four days the stools that are evacuated assume a normal consistency and appearance. As soon as this occurs, all the disturbances usually disappear; in particular all painful sensations. Mucus, however, is passed for some time longer. This mucus, to judge by its appearance, is freshly secreted. This demonstrates that the hyper-irritability of the mucus-secreting apparatus is not allayed at

once. At the same time the mucus no longer accumulates and the quantity is very insignificant. If the cure takes a normal course the secretion of mucus does not continue for longer than a week. In at least one-half of the cases the secretion of mucus ceases at once, as soon as soft motions are evacuated, and never returns thereafter."

We have already indicated our want of success in treatment by Von Noorden's diet, and, briefly to consider our objections, they may be stated as follows:—

If no colitis is present, such a diet is calculated to set it up in the case of a hypersensitive mucous membrane. If there is colitis, this diet is at variance with all the canons of treatment of such a condition as we recognise in chronic colitis.

It will be noticed that the use of oil enemata retained during the night, and the administration every morning of about half a pint of a natural chloride of sodium water, are included in the treatment. Boardman Reed¹ regards them as very important factors, the omission of which is distinctly inimical to the success of the scheme.

The Authors' Diet in the Treatment of Colitis

It is not fair to assume that the various diets which we have given represent the complete and

¹ Boardman Reed, *op. cit.*, p. 818.

invariable practice of the several physicians to whom they are credited. Whilst probably being fairly indicative of their general methods, they will in individual cases be modified out of all recognition. In such a highly complex subject as chronic colitis it is quite impossible to give a series of diets which shall adequately describe one's methods under the very many conditions occurring in actual practice which will require their modification. We think, therefore, that we may make this chapter of the greatest utility to the greatest number and avoid misrepresenting our own system if, instead of attempting to give a set of ready-made diets with the theoretical indications which call for them, we explain the methods which guide us in prescribing diets suitable for the different phases and stages of the disease.

With this in view the subject of diet must be considered under two heads:—

1. The articles of diet which may be comprised in our régime; and
2. The selection of articles from our list suitable for the case in hand.

In addition to the actual material selected, the important point is the degree of comminution in which it is presented to the patient. Food which may be quite suitable in kind may be unsuitable in consistency; conversely, food suitable

in its degree of comminution may be of inadmissible material. We thus see that for the efficient and scientific treatment of chronic colitis (as indeed, we may add, of all other diseases of the digestive organs) it is essential to have available not merely certain foodstuffs but also preparations made from them in degrees of consistency varying from liquids up through the different grades of thickened soups, purées, panadas, and semi-solids, until ordinary convalescent solid diet is reached.

The physician, one especially in the hurry of daily general practice, will find the greatest difficulty in ensuring the satisfactory preparation of foods. He will soon find that if he orders a food a little different from that in ordinary use, the patient's friends will clamour for more detailed instructions and expect him to teach their cook how to prepare it. Unless explicit instructions are supplied, the purée or panada ordered will take such a form as the ingenuity, the resources, or the prejudices of the cook may determine. It is true that recipes for invalid dishes are to be found in works on cookery; but as these are arranged unsystematically, without any regard to their consistency, a prolonged search is necessary before directions can be found, and the helplessness of the ordinary middle-class cook in the absence of specific instructions is almost proverbial.

We think, therefore, that we shall render this chapter of the greatest utility if, in addition to the list of the more usual articles of food required in the treatment of chronic colitis, we add short directions for their preparation. We shall then be in a position to proceed to develop the methods and principles which should guide us in the selection of the various dishes to form the actual menu of the patient under treatment. The physician will then be able to construct his diet list from day to day with modifications to meet the constantly varying indications of the case.

MATERIALS FROM WHICH A DIET MAY BE
CONSTRUCTED FOR ANY PARTICULAR
VARIETY AND STAGE OF COLITIS FROM
WHICH THE PATIENT IS SUFFERING

These will be arranged as far as possible in the order of consistency.

A. LIQUIDS

Under this heading will fall the beverages of the patient, and soups and broths and other liquid food.

Water.—The main drink of course must be water. Distilled water from the chemist, and that met with in commerce under the name of Salutaris, must be avoided. It is not generally realised

that distilled water is very irritating to mucous membranes, yet the simple experiment of putting a few drops of distilled water into one eye and a like amount of normal saline into the other affords a convincing demonstration.

The best waters to use in chronic colitis are the very slightly mineralised ones with slight or no effervescence, and natural waters are far preferable to those manufactured artificially. Those to be recommended include Evian, Mattone's Gieshubler, St. Galmier, and the real natural German Seltzer water in stone bottles (Oberseltzers and Niederseltzers). All strongly effervescing waters, either natural or artificial, are unsuitable.

Cocoa.—This is largely used in our treatment of chronic colitis to the exclusion of tea and coffee, and it has been found by experience that the addition of a small amount of extremely finely divided oatmeal not only increases the nutritive value of the cocoa but renders it less acrid and more digestible.

There are two chief makes of cocoa containing oatmeal on the market under the name of Cacao à l'Avoine (Cheval Blanc), manufactured by Manuel Frères, and Cacao à l'Avoine (Cassel).¹ There is very little difference between the two varieties.

¹ Both Cacao à l'Avoine (Cheval Blanc) and Cacao à l'Avoine (Cassel) are to be obtained from Callard & Co., 74 Regent Street, W.

Method of Preparation.—(a) Crush the tablet of Cacao à l'Avoine (Cheval Blanc) to a powder, and make into a paste with a little cold water. Dissolve this in some water and milk (preferably half water, half milk), and finally boil for some minutes stirring all the time and add sugar to taste. One tablet makes two cupfuls.

(b) Crush the square of Cacao à l'Avoine (Cassel) to a powder, and make into a smooth paste with a little cold water. Add the milk and water to make it the desired strength stirring all the time in order that there may be no lumps. Boil the whole for five to six minutes and sweeten to taste.

This cocoa may be prepared with milk or half milk and half water. One cube is sufficient for a medium size cup.

If required quickly, it may be prepared by mixing the cube in a little cold water, and pouring on the necessary quantity of boiling milk and water.

Coffee Substitutes.—In some cases it may be advisable to prescribe these as breakfast beverages. We have from Manuel Frères, Lausanne, Orge torréfié et malté (dried and malted barley), and Figues torréfiées et maltées (dried figs treated in the same manner); and from America we have Postum Coffee, a preparation made of dried and roasted grain.

Method of Preparation.—For $1\frac{1}{4}$ pints of cold water take $1\frac{1}{2}$ ozs. of Orge torréfié et malté. Grind it roughly, place in a saucepan with the water, and boil for four to five minutes. Take the saucepan from the fire, as in the case of ordinary coffee. Add cream or milk as desired. L'orge torréfié et malté, ground, can also be added to ordinary coffee in equal quantities.

Whey.—This has not received the attention which it deserves in the dieting of cases of gastrointestinal disease. It is not generally realised that many patients put upon a purely milk diet are unable to digest milk curd and in such circumstances they are really living all the time upon whey, the undigested curd appearing in the stools. The nutritive power of whey has been much depreciated, yet it contains the whole of the milk sugar and the greater part of the salts and of the soluble albuminoid matters of the milk.

On the Continent the valuable properties of whey are well recognised, and a familiar method of treatment is the whey cure which consists in the daily consumption of a regulated quantity of whey, either sweet or sour; yet in this country the chief application of whey has been in the fattening of pigs!

Method of making Whey.—Warm some milk and make it into junket in the usual manner, that is to say by adding to it one of the numerous pre-

parations of rennet, junket powders or tablets, to be obtained at the grocer. When it has firmly set, cut the curd up into blocks and pour the whole upon a piece of muslin on a sieve which is standing in a large basin. The whey will filter through. The curds which remain need not be thrown away but may be eaten (of course not by the invalid, but by his relatives or friends) flavoured with a little pepper and salt, or with sugar and cream.

N.B.—Milk which contains preservatives will not make whey.¹

Hot Infusions of Dried Plants.²—These, which are almost indispensable in the treatment of intestinal affections, are almost entirely neglected in this country, although they are extensively employed on the Continent. The following are in common use:—

Camomilles.—These must not be confounded with the English Camomile of the British Pharmacopœia, which is the *Anthemis Nobilis*. The Camomille used for infusion is the Camomille des Champs (*Camomilla Arvensis*), a small flower growing in the meadows of Switzerland and Germany.

¹ Whey is to be obtained commercially, either plain or malted, from the Severn Valley Products Company, Stonehouse, Glos. A sample case containing one of each will be sent on receipt of 1s.

² These herbs for infusions can be procured from Callard, 74 Regent Street.

Tilleul Suisse.—These are the dried flowers of the *Tilia Europea*. The infusion is a mild nerve sedative.

Menthe Aromatique de Jura—Peppermint.—This is invaluable in many cases of abdominal discomfort.

Myrtilles.—The dried berries. It is sometimes advisable to give, in addition to the purée and juice, an infusion made from the dried berries.

Method of Preparation: Camomilles.—Take a small pinch of the flowers and pour on boiling water (for a cupful). Allow to infuse one to two minutes, strain and drink hot or tepid. It should be taken preferably on rising or going to bed.

Tilleul Suisse.—Take a large pinch of the plant, and pour on boiling water. Allow to infuse for three to five minutes, pass through a fine strainer, and drink tepid or cold with or without milk.

Menthe.—Pour boiling water on a pinch of the menthe (one heaped teaspoonful to $1\frac{3}{4}$ pints), allow to infuse for three to five minutes, strain, add sugar to taste and drink hot.

Myrtilles.—The juice may be obtained commercially or may be freshly prepared as follows:—250 grammes of dried berries are mixed with 1 litre of water and boiled down to 750 c.c. The berries are pressed out, strained through a cloth, and the juice obtained is added to the 750 c.c. This is to be sterilised by boiling and kept in

bottles in a cool place. In this country the difficulty of pouring the dried berries renders the use of the commercial preparations necessary (Winternitz¹).

Before proceeding to the main portion of this chapter, it may be as well to draw the reader's attention to a couple of terms used in cooking; since we are repeatedly reminded that, although elementary, they are unknown to the average middle-class cook. The terms are *Court-Bouillon* and *Cooked-Creams*.

Court-Bouillon is a flavoured liquid utilised by all French cooks in boiling all fresh-water fish and many sea-water fish which lack a distinct taste of their own; it imparts to the fish a decidedly appetising flavour. It is prepared as follows:—

Place three or four ounces of carrots, the same quantity of onions, a bunch of parsley, a sprig of thyme, two bay leaves, twenty peppercorns, and a teaspoonful of salt into a large saucepan with two quarts of water and a tumbler of vinegar. Let it simmer for an hour by the side of the fire, strain, pour into a deep pot and set it aside for use. It will keep for some time if it is boiled every four days and a little water is added to replace that evaporated.

¹ Winternitz, *Neurasthenie*, p. 77, Glatz, Geneve, 1898; and Hemmeter, *Diseases of Intestines*, vol. i. p. 469. London, 1901.

An easier method, but one which gives less satisfactory results, is to place the same amount of onions in the pot with the water and vinegar, but substituting for the rest of the ingredients a packet of dried shredded julienne of vegetables and a bouquet of herbs. Such culinary materials should be quite familiar to any cook.

Cooked-Creams (recipes for which are given on p. 169) are little puddings which are made in small moulds and turned out before serving and with which a sweet sauce is generally used.

Soups

As all meat extractives are excluded from our régime, the only soups permitted are those prepared with a non-meat basis. We have at our disposal quite a number of very palatable “*Soupes maigres*” prepared according to the French cuisine without meat; soups made by cooking one of the farinaceous flours in water or milk; and for special purposes those made by mixing a purée of vegetables raw or cooked with a vegetable stock and raw meat soup. It is not generally realised by cooks that it is possible to make a vegetable stock which will challenge comparison with many of the meat stocks in common usage, although the flavour can never be exactly equalled.

We will commence by giving a recipe for a

vegetable stock which is ascribed to Sir Henry Thompson.¹

Vegetable Stock.—Slice two carrots, two turnips, a head of celery, two onions; put into a frying-pan with a few sweet herbs and half-a-pound of butter. Fry until well browned, then put them with three cloves, some salt and black pepper into six pints of cold water in a saucepan; bring to the boil and gently simmer two or three hours, reducing to four pints, not less; strain off into a vessel, let it stand for use. When required, pour off the clear liquor, leaving the deposit, and you will have a fair vegetable stock. In order to give body, five ozs. of tapioca should be added, at the beginning, which will thicken it a little without interfering with its transparency.

As further hints on the subject of preparing vegetable stocks the following simple principles may be added each of which may be considered for practical purposes as a vegetable stock:—

1. The water in which vegetables have been boiled can be reduced and additional flavouring added.

2. A small amount of crème d'orge or of Robinson's patent barley can be added.

3. A small muslin bag containing bran may be stewed in the required amount of water.

¹ Thompson, *Food and Feeding*, p. 147. London, 1901.

The flavouring should consist of any vegetables in season with a bouquet of herbs also contained in a bag and allowed to stew with the stock. It should be borne in mind that in order to extract the maximum flavouring from onions, they should be cut into slices and slightly fried before being placed in the bag with the other ingredients.

At this point a few words may not be out of place in reference to the commercial vegetable soups. At the present day, among the crazes so popular with the lower middle classes that of "hygienic food" certainly holds pride of place.

And whilst every day witnesses the birth of a new food fad—Chittendenites, Fletcherites, the advocates of one meal a day and even the apostles of complete starvation!—most of them are variations on what is regarded as a return to the simple life with restriction to uncooked food, vegetarianism, or other phases of a non-fleshy dietary.

The business side of the matter has been vigorously exploited, and a large number of foods to fill the gap caused by the withdrawal of meat have been placed upon the market and extensively pushed in literature devoted to the propaganda.

It has been discovered that the extractives of yeast, when treated in a certain way, produce a flavour strongly resembling that of meat, and the resemblance is developed to such a degree that every variety of "mock-meat preparations" is

procurable, ranging from "mock clear mannite" to "mock cutlets" or "mock roast." Our present object is strongly to dissuade any patient from attempting to increase the palatability of his food by the addition of any of the commercial vegetarian meat flavourings which are in nearly all cases yeast derivatives, for these are quite as injurious and productive of gout as the extractives of meat.

Leguminous Soups

It is important to bear in mind that leguminous soups and gruels form a class by themselves in the treatment of chronic colitis, and must not be ordered indiscriminately with the farinaceous ones. As a rule they are not allowed until much later in the course of the cure.

White Bean Soup.—Place in a saucepan half a pint of white beans and half a pint of young scarlet runners broken into small pieces, and a moderately sized peeled potato. Cover with water. As soon as the potato is cooked remove it from the saucepan and work it into a paste upon a plate with a tablespoonful of salad oil and a pinch of basil. When the beans are cooked pour the potato paste into the saucepan, thoroughly incorporate with the contents, add salt to taste, pass through a hair sieve, return to the saucepan, heat and serve.

Green Bean Soup.—Boil half a pint of flageolets verts in salted water. Put through a hair sieve. Add the yolk of an egg and half a cup of cream (see p. 155 for the method of adding egg to soup). Return to the saucepan, heat and serve.

Haricot Soup.—Take a spoonful of Farine d'Haricots and mix to a paste with a little cold water. Put this into half a pint of boiling water, stir and cook for twenty minutes on a slow fire. Add a little fresh butter when serving.

The following are prepared in exactly the same manner :—

Lentil Soup.—Farine de Lentilles, a teaspoonful or more to the pint. The exact amount depends upon the thickness required.

Green Pea Soup.—Farine de Pois Verts, a teaspoonful or more to the pint. Farine de Pois Jaunes.

Farinaceous Soups

These are made by boiling farinaceous flours with milk or water. The available materials from which to make them are :—

Robinson's prepared groats and Robinson's patent barley of English manufacture, and the Lausanne preparations, Fleur d'Avoine (oatmeal), Crème de Riz (rice), Crème d'Orge (barley), Farine d'Haricots (haricot bean), Farine de Lentilles

(lentil flour), Farine de Pois Verts (green pea flour), Farine de Pois Jaunes (yellow pea flour), Semoule de Froment (fine semolina), tapioca, rice.¹

As regards the relative merits of different makes, we think that in the treatment of intestinal affections the preparations of Manuel Frères are to be preferred to the commoner farines which are ordinarily met with in grocers' shops.

Barley Flour Soup.—Take 2 oz. of Crème d'Orge (Manuel) and $1\frac{1}{4}$ pints of milk. Mix the flour with a little cold milk and turn the paste thus obtained into the boiling milk. Cook for ten to fifteen minutes. Salt to taste.

A delicious soup can also be prepared from Crème d'Orge by replacing the milk with water or broth.

Cream of Rice Soup.—Take 2 oz. of Crème de Riz (Manuel) and $1\frac{1}{4}$ pints of milk. Mix the flour in a little cold milk and turn the paste thus obtained into the boiling milk. Cook for ten to fifteen minutes on a slow fire. Salt to taste. For children, sweeten slightly.

A delicious soup can also be prepared from Crème de Riz by replacing the milk with water or broth.

Semolina Soup.—For one person :—Take 2 oz. of Semoule de Froment (Manuel), mix with one

¹ All of these can be obtained from Callard, 74 Regent Street.

pint of water, milk, or broth. Salt slightly, and cook for ten to fifteen minutes. Add fresh butter when serving.

Tapioca Soup.—For one person:—Take 1 oz. of Tapioca Perlé (Manuel) to $\frac{1}{2}$ pint of milk (or broth). Put the tapioca into the boiling liquid, stir, and cook for fifteen to twenty minutes. Add salt or sugar, as the case may be, and the beaten yolk of an egg.

Fruit Soups

Fruit soups, so largely used on the Continent, are, with the exception of prune soup, inadmissible in the diet of chronic colitis.

Prune Soup.—Wash and soak one and a half pounds of prunes overnight in four pints of water, and the following day simmer them gently for two hours with one thinly sliced lemon and a stick of cinnamon, and half an hour before serving the soup add half a cupful of sago and sugar to taste. The sago must be thoroughly dissolved and enough water added to make the quantity two quarts. Remove the cinnamon before serving the soup.

(This soup is useful in several conditions.)

The Addition of Egg to Soup.—Most soups are improved and their nourishing character is enhanced by the addition of yolk of egg before it is

served. This of course is only to be done on the prescription of the physician as a part of the régime. The proper method of adding raw eggs to soup is as follows. Break the eggs into a cup and separate the whites. Beat up the yolks with a few spoonfuls of milk, cream, or stock. Bring the soup which you wish to thicken to the boil, and remove to the side of the fire. After it has commenced to cool, add the egg mixture drop by drop, stirring all the time.

Leguminous Gruels

These are made from precisely the same ingredients, and in the same manner as the farinaceous soups already given. The only difference is that a sufficient amount of the material is used to bring the food to the consistency of a gruel. Thus we may have:—

Haricot Gruel.—Farine d'Haricots.

Lentille Gruel.—Farine de Lentilles.

Predigested Lentil Gruel.¹—Benger's Pancreatised Lentil Flour.

Green Pea Gruel.—Farine de Pois Verts.

Yellow Pea Gruel.—Farine de Pois Jaunes.

¹ This preparation does not keep well; it must therefore be ordered specially from Benger & Co., the Otter Works, Liverpool.

Farinaceous Gruels

Barley Gruel.—Crème d'Orge or Robinson's prepared barley.

Oatmeal Gruel.—Fleur d'Avoine or Robinson's patent groats.

Rice Gruel.—Crème de Riz.

Semolina Gruel.—Semoule de Froment.

Tapioca Gruel.

Purées

Under this heading we have :—

Potato Purée, Leguminous Purées, Purée of green vegetables, and Fruit Purées.

For making purées, panadas, soufflées, pounded meat and other articles of the régime it is necessary to have certain apparatus.

A Dana chopper and flaking machine will serve as the ordinary mincing machine, and with it raw vegetables and salads can be reduced to a pulp. It can be procured at Shearn, 234 Tottenham Court Road.

A hair sieve, a wooden spoon and a pestle and mortar will also be necessary.

A tammy bag (tamis), to reduce food to a finer state of subdivision than is possible in a sieve (especially if fruit is required), will be needed. A very convenient form is home-made and consists of an elongated bag like a stocking and about a foot in length. It can be made of various

material, muslin, calico, according to the food-stuff for which it is to be used. The cooked and mashed fruit is introduced into the bag, the free end of which is twisted as in wringing clothes. The pulp with which the bag is filled will be forced out through the interstices of the material in a state of the finest consistency.

Directions for making a Purée.—There is a right way and there is a wrong way of making a purée. The right way is as follows:—

Place a hair sieve over a large basin. Have ready a wooden spoon with which to rub the ingredients and a kitchen spoon on a plate, the former to be used for scraping the pulp from the underneath part of the sieve and the latter for receiving the débris which will not go through the sieve. Pour some of the material you are making into purée on to the centre of the sieve and rub vigorously through with the wooden spoon. Lift the sieve every few minutes, taking care to keep it quite level, and scrape the pulp from the underneath part into the basin. Patience is required to rub the material *into small portions* until only the coarse débris remains on the sieve: always remove this before adding a fresh portion of pulp.

A vegetable or fruit purée made in this manner will be fairly finely divided, but it may be further refined by passing through the tamis bag.

Potato Purée.—This stands in a class by itself, as it is usually the first and for a long time the only vegetable purée allowed in the treatment of chronic colitis.

Bake or boil in their jackets three or four good-sized potatoes, cut them open, remove the floury part from the interior, pass it through a coarse hair sieve. Add a little butter, milk and salt. Mix well together, return to the saucepan, and heat with constant stirring for five minutes.

It is found in practice that many patients, and nurses and others in charge of patients are under the delusion that mashed potato is identical with potato purée. In about half the cases to whom potato purée has been ordered, a little questioning will elicit the information that mashed potato has been given as “they thought it was the same thing.” It is really quite otherwise. Purée of potato should be of the consistency of thick cream, and should not be accepted by the doctor unless it comes up to this standard.

Purée of Fresh Vegetables

Carrot Purée.—Take young carrots. Wash them well, scrape them clean and cut them into pieces. Put into a saucepan with vegetable stock (recipe, p. 150) and stew for from half an hour upwards according to their tenderness. Pass

through the sieve with a little of the stock, replace in the saucepan, dust well with flour, and cook for ten minutes, stirring all the time.

Purée of Endive or Lettuce.—Take care that the endive is the Chicory and not the Endive Belge. Stew several heads of endive or a large lettuce (or several small ones) in water or in vegetable stock (*vide* recipe, p. 150), drain and cover with cold water. Drain off the water again, cut up small and pass through a sieve. Now heat some butter in a saucepan and add the endive or lettuce. Heat until the moisture has evaporated stirring all the time, powder with flour, add some of the liquid in which it has been cooked or, if the case permits, some gravy from a roast leg of mutton or joint of beef. Season to taste and cook very slowly at the side of the range for a quarter of an hour. Serve.

A simpler method is, after it has been passed through the sieve to return it to the saucepan and heat it sufficiently hot to serve, adding a few spoonfuls of the liquor in which it has been cooked.

Purée of Cauliflower.—Cut up the cauliflower into large pieces, wash and drain. Put into a saucepan with three cloves, and a little parsley, basil, and marjoram and a small onion. Cook very slowly for ten minutes and then add some veal broth or water or vegetable stock, and continue the cooking until it is quite tender. Turn

out upon a colander and drain carefully, at the same time removing the flavouring agents. Pass through a sieve, return to the saucepan, add a few spoonfuls of water or vegetable stock or, if the case permits, gravy from a leg of mutton or joint of beef, heat and serve.

Mixed Vegetable Purée, No. 1.—Take three carrots, washed, scraped, and cut into slices, one head of celery if in season, two leeks, a lettuce, and a small cabbage, all washed and cut into quarters. Place all these vegetables in a saucepan with a quarter of a pound of butter and cook for ten minutes, stirring continually. Add a quart of cold water, bring to the boil and skim. Remove the saucepan to the side of the fire and simmer for one hour. Pass through a hair sieve, heat and serve.

Mixed Vegetable Purée, No. 2.—Take any mixture of vegetables that are in season, *e.g.* peas, beans, lettuce, endive, onions, leeks, and cook in vegetable stock until tender. Drain. Then pass through a Dana flaking machine, put through a sieve, return to the saucepan with a little of the liquor in which they have been cooked, heat and serve.

Raw Vegetable Purée.—Take any raw vegetables such as peas, beans, lettuce, carrot, shallots, corn-salad, and pass through a Dana flaking machine until reduced to a pulp. Pass through a sieve and stir up well with any vegetable soup (*vide* recipes, p. 52) and serve.

Purée of Green Vegetables, 2nd series.—The purées already given were made by stewing the vegetables, whereby most of the salts were lost. In the method employed by Dr. Herschell, the vegetables are cooked in a double saucepan of peculiar construction (the Empress Double Cooker). In this way they are cooked by dry heat of not too fierce a degree, the only moisture in the inner pan being that which comes from the vegetables themselves.

Fruit Purées

In the treatment of intestinal troubles the addition of fruit must be conducted with very great caution, and for a long time any fruit which is allowed must be carefully freed from pips, seeds, skins, and fibres. With these precautions many kinds which otherwise set up disturbances may be taken in moderate amount with impunity. Nearly all fruits may be made into purées, the most useful being apples, pears, French plums and quinces.

Method of Preparation.—The fruit must be cooked until quite soft. Apples should be stewed or baked, pears stewed, French plums soaked and then stewed with sugar. Dried fruits such as Californian apricots, Californian plums, dried apples, Normandy pippins, may all be made into purée by being soaked in the usual manner before cooking. A compound purée, very useful in the

treatment of constipation in children, is made by stewing together a mixture of fruits as follows :—

Mixed Fruit Purée.—2 parts of apples, 1 part each of French plums, figs and dried apricots, which have been well soaked. Stew together for several hours. After the fruit has been well stewed it is mashed and passed through the tammy bag and can be served at once. If a proper proportion of sugar be added during the process of cooking, the purée will keep for a reasonable time and may be put into jars and tied down in the same manner as ordinary jam.

Myrtilles.—It is necessary for emphasis to devote a special paragraph to this fruit, as it plays a most important part in the treatment of intestinal troubles. In the régime of chronic colitis it is for a long time the only fruit which may be allowed.

Pâtés Alimentaires

These, well known as Italian pastes, and not used nearly as much in the cooking of everyday life in England as they deserve, are of extreme value in the treatment of colitis. In this country the average cook is acquainted with macaroni and vermicelli as the sole representatives of this class, and her knowledge of these is limited to the preparation of a macaroni milk pudding or of macaroni cheese. In France and Italy the pastes very

deservedly form a large portion of the food of all classes. Of these pastes there are two kinds, that manufactured in Italy, and that made by Manuel Frères of Lausanne, the latter especially for administration in disorders of digestion and immeasurably superior to the common macaronis of Italian make. They are met with in different shapes, the substance of which they are made being the same. Thus we have Spaghetti, Macaronelli Fins, Macaronis No. 3, Vermicelles, Coquilles and Nouilles, between which there is practically nothing to choose. In our own practice we invariably order the Spaghetti or the Nouilles as being of a convenient form.

Method of Preparation.—Take about two oz. for each person, throw into a sufficient quantity of boiling water slightly salted, and cook from thirty minutes to one hour. Turn into a colander and drain. Add a little butter and serve.

It is essential that the material should be kept hot during the draining. If the cook is expert she can keep it hot enough to melt the butter which is added before serving, so that it will not be necessary to put it into the oven for this purpose. The secret is to put the colander into boiling water until it is wanted, and then stand it in the mouth of a saucepan which has been placed on the top of the range. This will effectually keep the material hot whilst draining.

Macaroni cooked in Stock.—This is mentioned merely for completeness. Stock may be used instead of water, but it is as a rule contra-indicated in colitis, where extractives are not desirable.

Macaroni à l'Italienne.—Proceed as in the previous recipe until the macaroni is about half done, then add, whilst continually stirring, an ounce of grated parmesan cheese. When nearly cooked, add a little pat of butter and dust over it some parmesan cheese. Hot tomato sauce may be poured over it or served separately.

Macaroni au maigre (sweet).—Boil four ounces of macaroni for five minutes, strain and place in a saucepan with a pint of milk. Simmer until tender. Thicken any milk left unabsorbed with baked flour or white *roux*, flavour with cinnamon or vanilla, and sweeten with sugar or saccharin.

Macaroni au maigre with Cheese.—Proceed as in the last recipe. During the last half of the process, stir in a tablespoonful of grated parmesan and a pat of butter.

Plain Boiled Rice.—Rice forms a very important part of the régime. It is eaten as an accompaniment to meat in alternation or conjunction with purée of potatoes and the alimentary pastes.

Method of cooking Boiled Rice. Method 1.—This method should give a perfect result; each grain will be as separate as when raw, perfectly tender and pure white in colour.

The rice must be first washed and rubbed between the hands in many waters until no cloudiness is imparted to the water. The last clear water is then poured off. The rice is put in a large saucepan and pressed down gently with the hand to a level by placing the hand lightly palm downwards on the rice and pouring on enough cold water to cover the back of the hand. This will be in the proportion of about two cupfuls and a half of water to one of rice. There should be at least six inches of space in the saucepan above the rice for the steam.

Cover the saucepan tightly; weight it, or if the cover does not fit tightly put a towel round the edges, for it is essential that the steam must be kept in. Put the saucepan over a hot fire. After about a quarter of an hour the steam will escape here and there. This is the crucial moment. Smell the steam, and if it smells strongly of rice this part of the cooking is done; if not, let the process go on until it does. Do not lift the cover, for the whole success of this method depends upon the cover remaining in position until the rice is used. When the steam smells strongly of rice take the saucepan from the hot part of the stove and put it back where it is fairly hot but not hot enough to boil or burn. In about twenty minutes take off the cover and you will find the rice cooked. Do not

remove the rice which sticks to the sides and bottom of the saucepan.

Boiled Rice. Method 2.—The largest available vessel is taken, a fish kettle, *e.g.*, in default of a saucepan of sufficient size. Fill it with water and bring to the boil. Then sift into the boiling water the rice, which should have been picked over but not washed. Continue to boil quickly for one minute. Now add a little cold water to check the boiling and heat so that the rice boils slowly but continuously for another fifteen minutes. The right degree can be ascertained by feeling when the grains are soft when pressed between the thumb and finger.

Drain and return to the saucepan, which should have been dried and buttered. Cover with a clean cloth and allow to steam for fifteen minutes at the back of the stove, or in a very slow oven with the door partly open, stirring from time to time with a fork.

Milk Puddings

Baked Milk Pudding.—Into a pie-dish put sufficient rice, tapioca, semolina, or sago to cover the bottom of the dish. Fill with sweetened milk. Grate a little suet upon the top and bake. This ought to produce a perfect pudding. The fault most cooks make is to put too much of the material into the dish and to add eggs.

Boiled Milk Pudding.—For the treatment of chronic colitis the boiled milk pudding appears from experience to be more suitable than the baked. The boiled milk pudding may be made of rice, tapioca, semolina, or sago. We will describe the preparation of boiled rice pudding as a type.

Boiled Rice Pudding.—Take $1\frac{1}{2}$ oz. of rice for each person. Wash the rice in three waters. Place milk and water in the proportion of three cups of milk to half a cup of water in a saucepan and bring to the boil. Sprinkle in the rice. Stir for ten minutes whilst cooking and then cook slowly for two hours at the back of the stove. Stir from time to time so that the rice does not stick to the sides of the pan. When done, allow to cool until lukewarm. Stir in the yolk of one or two eggs, first having sweetened to taste. Put in the oven and heat thoroughly.

Rice Pudding.—Place $3\frac{1}{2}$ oz. rice in $1\frac{3}{4}$ pints of milk and cook for one hour. Remove from the fire, allow to cool and add the yolk of one egg and sugar or flavouring to taste. Mix well, turn into a pie-dish with or without some breadcrumbs, and place in a very hot oven for five to eight minutes.

Semolina Pudding.—Take $3\frac{1}{2}$ oz. of semolina (Semoule de Froment) and place in $1\frac{1}{4}$ pints of boiling milk. Stir and cook for twenty-five minutes. Take from the fire, allow to cool sufficiently, and add $\frac{1}{2}$ oz. of castor sugar and the yolk of an egg.

Mix well and add any flavour desired, such as vanilla, lemon, &c. It may be served as it is or turned into a dish with breadcrumbs, placed in a very hot oven and heated for five to eight minutes before serving.

Tapioca Pudding.—For one person : Take 2 oz. of Tapioca Perlé (Manuel) to 1 pint of milk. Cook as for soup for twenty-five minutes, take from the fire, add $\frac{1}{2}$ oz. of castor sugar and the yolk of an egg and place in a very hot oven for five to eight minutes ; or without placing in the oven, add sugar, and flavour with vanilla, lemon, &c.

Tapioca du Brésil (Manuel) can be substituted for Tapioca Perlé, in which case it is necessary to cook the soup for only five minutes, and the pudding for fifteen minutes.

Cooked Creams

These can be made of any maize or rice flour and flavoured with chocolate, vanilla, lemon, or orange. As examples we will take :—

Crème au Chocolat.—Scrape a stick of chocolate into a saucepan with some milk, dissolve and bring to the boil. Then work up sufficient Crème de Riz, cornflour, or ground rice into a paste with a little cold milk, pour into the saucepan, and cook slowly for ten minutes. Stir and allow to cool. When just warm, add the yolk of one or two eggs, stir

well, pour into a mould and allow to set. Turn out before serving.

Crème à la Vanille.—Sweeten some milk or cream with castor sugar. Put into it some pieces of vanilla—three or four each about half an inch long. Boil. Remove from the fire as soon as boiling begins and allow to cool. Stir in the yolks of two or three eggs. Strain through a tammy. Pour into little cups or moulds and let it set in a *bain-marie* over a moderate fire. Remove the pieces of vanilla. Serve when cold.

Crème à la fleur d'Orange.—Prepare exactly as the preceding, substituting orange flower water for the vanilla.

Omelets

Plain Omelet.—A plain omelet, as sent to table by a competent French cook, soft, succulent, and juicy, may be included in the diet from a very early stage. The tough and leathery effort of her English confrère is best let alone. There is not the slightest difficulty in producing a really first class result if attention be paid to a few important details. In the first place, unless an expert, you cannot make an omelet with less than three eggs and four are better. Take the eggs, break into a basin, and mix the yolks and whites *lightly, hardly beating at all*. Add pepper and

salt or castor sugar, according to the kind of omelet required. Melt a large lump of butter in an omelet pan. Pour in the eggs, *stirring slowly* until the mixture begins to thicken. Then pass a bent-handled omelet knife under the omelet to ensure that it does not stick to the pan. Have ready a warm plate. *Whilst the surface of the omelet is still fluid*, fold in two, and toss out on to the plate.

By appropriate additions we have :—

Omelet au Confiture.—Place a tablespoonful of jam on the centre of the omelet before folding.

Omelet au Jambon.—Finely-chopped ham is sprinkled upon the omelet before folding.

Omelet aux Fines Herbes.—Sprinkle the omelet before folding with a little chopped parsley or other flavouring herb.

SELECTION OF THE DIFFERENT ARTICLES OF DIET SUITABLE TO THE DIGESTIVE CAPACITY OF ANY INDIVIDUAL PATIENT

We have already explained how the adoption and modification of a diet suitable to the digestive capacity of any individual patient may with certainty be controlled by the use of a test diet and the subsequent examination of the corresponding stools (see p. 78); and as it is the intestinal contents which influence the variety and pro-

portions of the intestinal flora, we are able, by the regulation of the diet, to set up any condition we may desire. As a general rule, we must remember that the diet should consist largely of fats and albumins when fermentation is present and of hydrocarbons when there is putrefaction, Strasburger's fermentation test supplying the information which régime to adopt.

In the majority of cases of chronic colitis there will be neither pronounced fermentation nor putrefaction; and the choice of aliments is influenced by the manner in which they are digested in the intestinal tract, and their effect in increasing or diminishing the colitis.

And we may at once state that in the treatment of this class of case we are in complete agreement with the principles of Combe and Bourget, that apart from its influence upon the intestinal flora the essential character of a diet in chronic colitis should be its non-irritating properties, an opinion which, we may once more remind the reader, is diametrically opposed to the view of Von Noorden.

A good general working rule is to commence with a bland and non-irritating diet of farinaceous material, if necessary pre-digested. As the bowel gradually recovers, vegetable substances in the form of purée are added little by little in such degree as the intestine is trained to tolerate them,

until finally the fullest diet is reached with which that particular patient's digestive apparatus can efficiently deal.

One estimates whether any particular article of food is suitable and may be allowed—

(a) By the amount of its undigested residue which appears in the stools.

(b) By the effect produced upon the mucus in the stools in the direction of increase or diminution, and

(c) By the effect upon the fermentative and putrefactive processes in the intestine.

An article of food may be tentatively allowed in small quantity if—

(a) It does not appear as undigested residue in excessive amount in the stools.

(b) It does not increase the amount of mucus in the stools.

(c) It does not increase intestinal fermentation or putrefaction, and

(d) It does not increase the subjective discomfort of the patient.

The same principles will guide us in regulating the amount allowed, since the article of diet may be cautiously increased until the examination of the stools shows us that the maximum amount which can be manipulated has been reached.

It will thus be at once seen that the key to the construction and modification of the régime

is, from first to last, the microscope, and it is only by its regular use that one can treat the patient scientifically.

As a general guide, the following list may be given as the order in which the different foodstuffs are most usually added to the diet :—

Gruels, pâtes alimentaires, purée of potatoes, rice and other farina (spaghetti, nouilles), purées of fish, chicken and meat; rusks, biscuits, milk puddings, roasted or boiled meat or birds; leguminous purées, purées of fruits, purée of green vegetables, and finally fresh fruits.

The chief point to which interest will naturally be directed will be the criterion of progression—how long must elapse between successive additions, a question of equal importance with that of the quantity of each food allowed.

There is only one method of answering this question, and at the risk of becoming wearisome we must again point out that this is achieved by adopting the microscope as an infallible guide.

Let us take a simple example and suppose a patient at present upon a diet consisting of gruel, rusks, and four ounces of pounded chicken per diem. If an examination with the microscope of a minute portion of the stools shows that the muscular fibres are few in number, of small size, rounded at the ends, and without distinct striation and that there is no undigested starch, the infer-

ence is that digestion is proceeding satisfactorily, and that the diet is well within the functional capacity of the stomach and intestines. The medical adviser is encouraged to proceed a step further and allow a small quantity of meat to be taken which is no longer pounded but cooked in the ordinary way. This would be in answer to the oft-recurring question of the patient, "Can I have meat grilled or roasted and not in the form of a purée?" It is the only way in which such a question can really be answered, as the sensations of the patient give no clue whatever as to whether the meat has been digested or not. If, on the other hand, one relies upon the patient's subjective symptoms and allows him to proceed to solid meat because he is able to take the purée without discomfort, the procedure is a simple gambling on the chance that digestion was properly performed, an inexcusable system, since exact knowledge on this point can be so easily obtained.

Of course the stools must be again examined in a few days after the meat has been allowed to see whether digestion is still satisfactory, as otherwise it may be necessary to administer either pancreatin or the pancreatic hormone to reduce the amount of meat or return to the meat purée.

In the hypothetical case we have mentioned, should a considerable amount of muscular fibre with

square ends and well-marked striation be found in the stools, it is certain that the digestion of meat is still too defective to justify its ingestion in any other than purée form.

It is obvious that patients should bring a small sample of their morning stools with them when consulting the doctor with reference to change of diet, or send it when writing for advice. A piece only the size of a haricot bean is required, and it is best conveyed in one of the small glass specimen tubes enclosed in wooden cases procurable from Baker of High Holborn.

It should be quite unnecessary to indicate to the reader who has reached this point, that it is virtually impossible to provide any individual patient with a set of printed rules for diet, with a list of aliments allowed and forbidden, and with a scheme of gradual extension of the diet which can be followed without supervision or modification. Patients invariably ask one, "How long must I continue this diet before I add anything else to it?" On the face of it, nobody without the gift of prophecy can answer such a question. It is impossible for the most experienced man in the world to be able to judge or surmise how the digestive organs of another man will be working in say a month's time. The utmost any physician can do is to advise or forbid any extension until the time is ripe for it (as demonstrated by micro-

scopical examination of the stools) and not in advance.

The key to the successful dieting of any digestive trouble is the microscope, and no one who neglects its habitual use can be said to be giving his patients the advantages which modern science has placed at his disposal.

But, it may be urged, this scientific method of dieting a patient is doubtless very desirable but it entirely prevents a patient treating himself and necessitates the continual supervision of a physician upon whom is involved a considerable amount of distasteful work with which he would willingly dispense.

From the patient's point of view there is no more reason why a man should expect to carry out a graduated scheme of diet without expert supervision than that he should expect to conduct a complicated lawsuit by means of some preliminary directions given him by his lawyers. As regards the physician, the reason why chronic colitis has acquired the reputation of being difficult to cure is precisely because it cannot be cured by routine methods but necessitates individual scientific work for each case; and those who have not the enterprise or the time or the inclination to do this work simply do not cure their patients.

C. THE REGULATION OF THE BOWELS

This will include the provision of a daily action of the bowels during treatment and the restoration of regularity of peristalsis in the intestine.

Probably the most important factor in the treatment of that form of chronic colitis associated with constipation is the cure of the constipation. Both Mathieu and Von Noorden have recognised and emphasised this in the case of what they have described as muco-membranous colitis: it is equally true in the commoner forms of colitis met with in daily practice.

The result of much sad experience has led to the conclusion that there is no hope of curing the colitis as long as laxative drugs (with the possible exception of castor oil) are habitually employed to secure a daily action of the bowels.

Modern medicine fortunately provides us with several methods by which the regularity of the bowels can be re-established apart from the use of purgative medicines. The correct treatment of chronic colitis is immediately to leave off the daily purge by means of which the patient secured more or less imperfectly a daily action of the bowels and commence the use of the methods whereby we may hope to restore tone to the bowel and regularise the function of defæcation. But unfortunately, as

is well known to every medical man who attempts to treat these cases scientifically, no sooner has the purge been abandoned and the proper treatment commenced than the patient begins to clamour for his daily evacuation and cannot be reassured that something dreadful will not happen unless this occurs. Of course this is pure delusion on his part, for it would do him no harm for the stool to be absent for the few days which as a rule are necessary for the methods which will institute regularity to take effect. But often no amount of persuasion will alter the patient's fanatical belief in his daily stool, and refusal to help him in its production will frequently result in his taking his habitual purgative on the sly.

It is best therefore to accept the inevitable and take steps to give the patient his daily stool. We have practically two methods of doing this: by regularly diminishing daily doses of a laxative drug, and by a small morning enema.

The choice of the means to be employed must depend upon circumstances.

The Daily Dose of a Laxative

We should prefer this method in those cases in which a comparatively small dose of the laxative still produces a moderately good stool. The secret of success is to commence with such a dose as will

just produce a moderate stool and diminish this daily in proportion as the functions of the bowels are improving under the other treatment which we are adopting.

To do this efficiently requires expert knowledge, and it is as a rule quite outside the capabilities of a patient on his own resources without supervision. It appears quite a simple thing to prescribe, let us say, a liquid extract of cascara and to tell the patient to take sixty drops for the first night and gradually diminish the dose night by night until the minimum which will produce a stool is reached. But the average patient is afraid of doing this and either reduces it too rapidly or not rapidly enough, and eventually gets into a state of confusion. That is the reason why patients do so well in a nursing home during the first couple of weeks of a routine treatment of chronic colitis. In the home the patient passes with comfort and safety through this period, the physician is able to see daily the result of the dose of the previous night, and is able to regulate it one way or the other according to the effect produced. If the patient cannot or will not enter a home he should visit the physician at least every two days to have the necessary alteration made in the daily dose.

Other things being equal the patient should be able to leave off the laxative in about a couple of weeks.

It must here be stated that in this place we are only considering the use of laxatives, merely as laxatives, and are deferring to another place (*vide* p. 221) their very important use in the treatment of chronic colitis for disinfecting and purgation.

A Daily Enema

A small enema of cold water of such a bulk as will just fill the rectum may be employed with impunity not only during the early days of treatment but whenever it is required to empty the lower bowel. In fact there is a form of constipation characterised by atony and dilatation of the rectal ampulla in which small water enemata have to be continued for months. These cases, which have usually been the result of habitual disregard to the calls of nature, are characterised by loss of the normal irritability of the nerves in such wise that the presence of fæces does not, as is nominally the case, initiate the reflex of defæcation. The unexpelled fæces accumulate until considerable dilatation has occurred and it can be seen that the rectum is never empty. Any stools descending from the colon will, it is true, drive out the fæces which occupied the rectum, *but only to take their place. The rectum is never empty and cannot be emptied by any laxative which does not liquefy the*

stool. In these cases the soundest practice is to wash out the lower bowel and keep it empty. When there is no inclination to go to stool, a small enema may be given to start the process, but in any case *after the patient has had his stool* the enema must be given again and the rectum washed out to remove the material which has just occupied it.

If this washing out is done for some months, the lower bowel will often recover its tone, an event impossible as long as it was always distended. In most cases the process of recovery requires to be assisted by local measures, the most efficacious of which is the sinusoidal electric current, either mono- or polyphase, applied either with a bi-polar electrode in the rectum or with one pole in the rectum and the other one or two on the ascending and descending colon.¹

It is a good working rule to order the morning enema to be taken after breakfast on any day on which a stool does not naturally occur. It is best to wait until after breakfast to allow the patient the benefit of the two stimuli to the peristalsis of the intestine—(1) The effect of rising in the morning. (2) The stimulus of breakfast.

The use of olive oil injections, whilst inci-

¹ Further specific directions as to technique will be found in Dr. Herschell's "Electrical Methods in the Treatment of Affections of the Stomach and Intestines" (Glaisher, London), and descriptions of rectal electrodes in the *Lancet*, April 8, 1911, p. 948.

dentally producing an action of the bowels, is mainly for its curative effect upon the damaged mucosa and for the relief of spasm, and will be further described in the section dealing with the specific treatment of colitis.

The methods at our disposal for the restoration of regularity of peristaltic function to the intestine are :

(a) Agents which produce alterations in the bulk, consistency, or hydration of the fæces.

(b) Oil injections.

(c) Peristaltic hormones.

(d) Drugs.

(e) Physical methods, massage, vibration, electricity, hydropathy.

The agents by means of which we can modify the contents of the large intestine are, seeds which become mucilaginous under the influence of water, water carriers such as agar, and oils both vegetable and mineral.

They are especially useful in cases in which the fæces become abnormally dry either from deficient supply, the water never reaching the colon; or from excessive absorption, when the fæces remain an abnormally long time in the intestine. They are also useful when there is insufficient residue in the intestine to act as the normal stimulus of defæcation. The oils are especially useful when, as in diseases of the rectum and in spastic colitis,

it is necessary that the stools should be of a soft consistency.

Psyllium Seeds.¹—From time immemorial, flax seed or linseed, sesame and psyllium have been used as household remedies in the treatment of constipation. The action of these has been scientifically studied by Langlebert working in the Paris Laboratory of Medicine under the direction of Prof. Vulpian. It is briefly as follows:—

The superficial cells of the seeds are rich in oily and mucilaginous substances and when brought in contact with water absorb it, swell up, and finally burst, extruding their contents, the whole forming a mucilaginous mass. The psyllium seeds appear to be the most efficacious of the three the seeds swelling up to four times their normal size before rupturing. We are thus able to introduce an oily mucilaginous mass into the intestine which in many cases will be found to exercise a distinct laxative effect. Psyllium seeds are the product of the *Psyllium plantago*, a plant which has the shores of the Mediterranean for its habitat. They are blackish in colour and small, being about a line in length by half a line in breadth. The dose is about a teaspoonful stirred up in water and taken at one or two meals, or at bedtime.

Agar.—In the group water carriers are included

¹ Procurable from Roberts, 76 New Bond Street.

agar and its commercial preparations. Agar consists of the dried jelly of the *Gelidium corneum*, a seaweed which grows in Borneo and Japan and has the power of absorbing water and swelling up into a gelatinous mass. It is met with in commerce in the form of scales, and when taken with the food each scale of agar absorbs water and thus most effectually softens the stools and renders them more bulky. As agar once having absorbed the water does not again readily part with it, the stools which are mixed with it in the intestine do not become hard and dry even after some time. Substances may be dissolved in the water which the agar absorbs, and thus agar supplies a medium by means of which protracted local action upon the coats of the intestines may be obtained by almost any drug we choose.

It was Prof. A. Schmidt who first called attention to the fact that in some cases of constipation with hard dry stools, intestinal digestion was too fully carried out; for the prolonged sojourn of the food residues in the intestine results in their dehydration and the disappearance of the normal cellulose residues.

When the fæces accumulate in the sigmoid and upper rectum in sufficient quantities to cause stretching of the bowel, peristaltic contractions originate and culminate in defæcation (Macmillan, *Constipation*, p. 55). In certain cases of constipation

this stretching never takes place because, as already explained, the stools are never bulky enough to cause it; but the only occasions when the bowels are opened spontaneously are due to the stimulus of the irritating products of fermentation. In other words, a chemical stimulus has become substituted for a mechanical one. It is in these cases that agar is of such great use. The agar absorbs and retains the water and, from its power in resisting the action of intestinal bacteria and enzymes, is secreted practically unchanged. It thus carries water into the stools and hydrates them, and in addition to preventing the formation of scybalous masses and imparting a soft consistency to the contents of the lower bowel, supplies that bulk which is able to stretch the bowel and act as the natural normal stimulus to peristalsis.

The dose is from a teaspoonful upwards and is gradually reduced as soon as the bowels commence to become regular until the minimum is reached which will produce a daily stool. In the treatment of chronic colitis, agar, in addition to regulating the bowels, acts as a kind of soft broom and clears out mucus and other irritating substances.

Schmidt found that the effect could be much increased by adding to the agar a small amount of cascara, not enough to make it a laxative but just sufficient to act upon the liver and increase the biliary secretion.

In the commercial preparations of agar, either cascara or *Rhamnus* is added with this object, but in some preparations an addition to the extent of 25 per cent. is made, which is much more than is necessary. In cases of chronic colitis, no agar preparation should be prescribed which contains more than 5 per cent. of *Rhamnus Frangula* or of cascara, an amount far too little to act as a laxative. Otherwise we shall not really be stopping the purgative.

The German preparations as a rule contain the large proportion of cascara, the French the smaller one.

Agar is also very useful as a carrier for astringents and other drugs which one wishes to act upon the mucosa, as it is carried rapidly into the large intestine and there slowly gives up the drug dissolved in it.

In our practice we are not in the habit of using any of the cascara-containing preparations, but as the agar requires to be gradually increased until the normal amount for the individual has been ascertained, we find it far sounder practice (since we do not require to alter the dose of the hepatic stimulant) to prescribe plain agar in scales and supplement this with a small dose of an hepatic stimulant given separately. Of these we have at our disposal, euonymin, iridin, podophyllin, and salicylate of soda.

Cream.—This may act as an efficient laxative if given in the proper manner. The amount of fat which can be disposed of in the alimentary canal is strictly limited, and anything beyond this amount will pass through the body undigested and tend to make the stools soft. It is obvious that the haphazard administration of small quantities of cream and butter in the expectation that they are going to act as laxatives is foredoomed to failure. The daily dose must be at least half an ounce in excess of the amount of which that particular intestine is able to dispose. As a rule, three ounces of cream will be required by an adult to produce any appreciable laxative effect. The reason why such comparatively small quantities of the paraffins are efficient is because these are not split up or otherwise acted upon but pass through the intestine unchanged.

Olive Oil.—This should *a priori* be more useful than mineral oil in the treatment of constipation, for in addition to acting mechanically as a lubricating agent it has two other distinct actions:—

1. When it comes into contact with the fat-splitting ferments in the intestine it is partially changed into free fatty acid and glycerin, both of which substances are direct stimulators of intestinal peristalsis.

2. It induces reflexly a flow of bile and of pancreatic juice.

But as a matter of fact it is in actual practice rarely possible to give sufficient olive oil to produce much aperient result, as very few patients can tolerate it regularly for any length of time and some have an unconquerable repugnance to it. Moreover, it inhibits the secretion of gastric juice and causes loss of appetite and nausea. When tolerated, as much as three wineglassfuls a day may be given. In most cases a certain amount can be given as a dressing for salad with lemon juice, not vinegar. A round of hot toast well soaked in it, peppered, and salted, can also often be taken at dinner as an entrée or savoury, but it must be quite hot. A method of disguising the flavour which we have often found successful is to scrape upon the toast, before pouring the oil upon it, a little pâté au diable.¹ It should then be put into the oven for a minute or two before serving.

The Paraffins.—These have practically replaced other oils and fats in the treatment of constipation. Those which are safe to use are all which melt below the temperature of the body or those already liquid or semi-solid. Hard paraffins with a melting point higher than that of the human body and the lighter hydrocarbons (naphtha, benzene, petrol) are of course inadmissible. The paraffins for use internally must be absolutely pure and decolorised

¹ A flavouring paste prepared apparently of anchovies and chilis and sold by Stembridge, Green Street, Leicester Square.

by treatment with animal charcoal, as some of the commercial paraffins contain impurities which act injuriously upon the heart. Liquid paraffins may be taken neat, preferably from a warmed glass, or flavoured with saccharin or some essential oil. Soft paraffin (vaseline) may be mixed with sugar into a confection,¹ or with tragacanth or with agar, and made into a jelly which can be agreeably flavoured.

Paraffins are best taken when the stomach is empty, as they will not adhere to moist mucous membranes and will pass quickly out of the stomach. If the stomach contains food they will mix with it and most probably form a coating over the particles which will hinder the action of the digestive juices. A very good plan is to take one daily dose of sufficient magnitude on waking in the morning.

The injection of olive oil is one of the most important means which we have at our disposal for the local treatment of chronic colitis. It will be fully discussed in the section devoted to that part of the subject, but it is mentioned here because in addition to being one of the best systematic methods of treating chronic colitis, it incidentally produces an action of the bowels, and is therefore a valuable method in the treatment of the accompanying constipation. Thus,

¹ Laxinol. Roberts, 76 New Bond Street.

whether used primarily with the idea of curing the colitis or of securing a daily action of the bowels, its double intestinal action will in either case come into play.

For the technique of olive oil injections the reader is referred to p. 244.

When injections of olive oil are given primarily to relieve constipation it is best to commence with 10 oz., injected at bedtime and retained all night. The dose is then reduced daily until the smallest amount is found which will produce one daily action of the bowels. One dose is then administered regularly every night until there has been a daily stool for six or seven days. The injection is then omitted on the next night. If, notwithstanding the omission, there is a stool next morning, we can give the injection every alternate night. If there is still a daily action, the injection is omitted on two consecutive nights. Later on three nights are missed, until finally the injection is given only on the evening of those days upon which an action of the bowels has not taken place.

Peristaltic Hormone.—In 1900, Sardou treated 140 cases of digestive disorders with intestinal extract in a dry form given by the mouth. Only about 15 per cent. of failures were recorded. The cases in which he gave it included simple constipation, muco-membranous enteritis with

constipation, enteritis without constipation, auto-intoxication from the intestine, and the acute crises of chronic colitis. The results were communicated to the *Bull. Général de Therap.*, 1903, p. 305.¹

It was given apparently quite empirically, save with the expectation that a maceration of any organ might possibly exert some benign influence upon the same organ when diseased. This is, of course, the very elementary ground idea on which opotherapy is based. In simple constipation it was noted that after a variable time there was a progressive re-establishment of the intestinal secretion and a return to the normal form and consistency of the stools with spontaneous evacuation.

In cases of colitis, the mucus and membranes progressively diminished. Sardou produced a cure in many cases of intestinal dyspepsia. Children with constipation were equally benefited. Doses have varied between 0.30 and 0.40 of the dried extract, and between 3 c.c and 5 c.c a day of liquid extract, given hypodermically. In preparing the remedy, both small and large intestine were macerated in glycerin and diluted with normal saline.

When the desired effect was obtained the dose was gradually reduced.

¹ "Note sur effets therapeutiques de l'extrait total intestin dans divers modalities d'insufficience l'intestinale."

The rationale of the remarkable effects resulting from these first crude and purely empirical experiments was systematised and explained when Professor Starling discovered that organs influenced each other functionally not through the nervous system, as was formerly supposed, but by the formation of chemical substances elaborated in the process of metabolism and carried by the blood stream to distant groups of cells which were thus stimulated to activity. In other words, internal cell products or internal secretions formed in the cells during their normal functioning enter the blood stream and have the power of increasing or retarding the function of other groups of cells quite independently of the nervous system, this latter fact being of the greatest importance in explaining their therapeutic use. These substances he termed "Hormones," from the Greek verb ὀρμαω, I excite.

The first hormones to be isolated were the following:—

Mamma Hormone.—This is produced in the impregnated ovary and growing embryo and causes hyperplasia of the mammary gland. The injection of this hormone produced enlarged mammae in virgin rabbits.

Placental Hormone.—This, derived from the placenta, caused the secretion of milk in the hyperplastic mamma only. In virgin animals it

was found necessary first of all to produce hyperplasia of the mammary gland by the use of the mamma hormone before milk secretion could be induced by placental extract (Basch).

Adrenalin.—This raises the blood pressure and influences the hepatic metabolism of sugar.

Secretin,¹ which is produced in the duodenal mucosa, stimulates pancreatic secretion.

Pancreatic Hormone, which is found in extract of pancreas, antagonises adrenalin and regulates sugar production. This is produced in greatest abundance in the Islets of Langerhans in the pancreas. It is now obtainable commercially under the name of Secretogen (Carnrick), and is used in the treatment of diabetes and digestive disturbances.

A hormone for the peristaltic action of the intestine could therefore be anticipated; and, according to the rule that hormones are produced through the agency of the secretion to be affected by it and to meet actual present need, it was probable that it would be found to be produced in the intestinal walls.

Zuelzer succeeded in extracting from the stomach and upper part of the duodenal mucosa a hormone which increased the peristalsis of the intestine, and found that it was stored in the spleen whence it could be extracted in sufficient amount to be produced commercially. In this

¹ Bayliss and Starling, *Journal of Physiology*, vol. xxviii.

latter situation it could readily be obtained in a sterile condition.

Since hormones act after entering the blood current, their action upon any particular organ must imply some special affinity or receiving apparatus, or some tuning of its nervous mechanism to the special excitement in the same way as the receiver of a wireless apparatus is tuned to respond only to waves of a certain length.

The relation of peristaltic hormone to habitual so-called atonic constipation is susceptible to various explanations which are at present entirely of a speculative nature.

It may be that in constipation the production of hormone is absent or deficient. Alternatively, the hormone may be produced in normal amount, but in the receiving organ the nerve mechanism may be permanently damaged by disease or temporarily exhausted or poisoned and so inhibited. Thus in atonic forms of constipation there may be—

1. Damage of nerve fibres, the result of inflammation.

2. Inhibition by toxins produced in the alimentary tract.

3. Exhaustion of the nerves by other non-physiological stimuli such as drugs.

In what manner the hormone stored in the spleen can be set free for use we do not know:

whether its production depends upon the presence of food in the intestine is hidden from us. It is quite possible that the stored hormone in the spleen maintains a constant supply in the blood current, so exercising a tendency to peristalsis which can readily be set up by the presence of food residues and by other local stimuli. Another difficulty is the fact that peristalsis in the colon usually takes place only at certain times during the day or night, which may coincide with the production of another ferment bearing the same relation to hormonal as enterokinase to secretin.

It is not impossible that the action of all the physical agents which have been found clinically to benefit atony of the bowel, viz. electricity, massage, &c., may really be that of stimulating the production of hormone in the intestine or of aiding its passage into the blood stream. This would, if it were true, explain the phenomenon which has puzzled so many of the earlier specialists upon gastro-intestinal diseases, that although they were unable to obtain contraction of the intestinal muscularis by means of electricity applied percutaneously, yet clinically the use of this agent often produced good results.

A large dose of hormone injected intravenously into a rabbit produces in a few seconds an energetic peristaltic action, commencing at the duodenum and proceeding along the alimentary canal to the

rectum. The action differs from that of physostigmine in that the latter produces a peristalsis which merges into a tonic contraction.

Zuelzer advises that the peristaltic hormone should be administered in one large dose of 20 c.c., injected intra-muscularly into the buttock or given intravenously. In small doses it seems to have merely the effect, common to all animal extracts, of raising the blood pressure, and in our hands it has certainly not appeared to produce any marked effect upon the intestinal peristalsis.

A large dose appears in some unknown manner to restore the peristaltic balance; and in the successful cases one dose was followed by the restoration of peristalsis to the normal, a condition which lasted for several months.

The injection into the buttock is usually followed by severe pain down the leg with sometimes numbness, probably owing to the bulk of the injection. In some cases there is a slight rise of temperature.

At the time of Zuelzer's article he had used the drug upon twenty-six cases. In six there was no result, but in fifteen he was successful (the remaining five could not be followed up). In our own practice we have obtained two successes out of six cases in which it was tried.

Of course the subject is at present in a purely experimental stage, and the chief effect of the

discovery of peristaltic hormone is to suggest strongly the necessity of entirely revising the orthodox conception of atonic constipation. This, so far from being due to weakness of the muscular apparatus of the intestine, may quite likely be simply a question of absence, deficiency, or abnormality of hormone. One of the chief uses of peristaltic hormone is in the treatment of post-operative ileus, which it should rob completely of its terrors.

Drugs.—The only drugs which are, so far as we know, of any use in restoring the muscular power of the intestine are strychnine and calabar bean. Occasionally, the application of long continued small doses of strychnia is crowned with success, but failures are far more usual, a result which would be expected if it should prove to be the case that many conditions of the intestine supposed to be atonic are really the result of some anomaly of the peristaltic hormone. Boas claims to have obtained good results with extract of Calabar bean and this latter drug has been extensively prescribed on the Continent.

Physical Methods of Treatment: *Massage.*—Whilst massage is certainly of limited utility in cases of atony of the intestine in the first stage before either a spastic condition has been established or inflammatory changes have occurred, its use later is admissible only in very few cases. It

stands to reason that any manipulation of an inflamed intestine cannot possibly do good and is quite likely to increase the mischief. Unfortunately, we frequently find in patients who consult us for constipation that the colitis complicating their case has not been recognised, and that they have been put through a course of massage with the idea that an ordinary case of atony of the bowels had to be dealt with. Furthermore, many patients prescribe themselves a course of massage upon their own responsibility, labouring under the error that constipation is a simple complaint which is always due to want of muscular tone, an error which unqualified practitioners are only too ready to perpetuate. A good working rule is rigidly to forbid massage if there is the slightest spontaneous pain, or if pain is produced by the act of massage.

Vibrotherapy.—The identical considerations which have been stated above apply also to mechanical vibration. Whilst of some value in uncomplicated atony of the bowel it is strongly contra-indicated if either spasm or pain be present.

Exercise.—Systematic exercises especially devised for the relief of constipation are widely advertised in the lay press as a certain cure and are even prescribed by medical men. Exercises to arms and legs may be used with impunity, but any special exercise employing mainly the abdominal muscles must be undertaken with the

greatest caution, if at all, when colitis is present. Moderate exercise in the open air, such as golf, is of course part of the general hygienic treatment of the patient, and can only indirectly have any influence upon the constipation. We may state here that our object in mentioning these physical agents, massage, vibration, and abdominal exercises, is mainly to warn medical men against either prescribing or allowing patients to prescribe them for themselves.

Electricity.—With electricity, however, it is far different. Not only is it a potent weapon against the intestinal atony, but, incidentally, the colitis will in most cases improve under its use. In fact, we can by means of the appropriate modality, relieve pain and spasm, strengthen the abdominal muscles, and in many cases favourably influence the atonic condition. The relief of pain and spasm will be dealt with in the section devoted to it. In this place we have only to consider the use of electricity in restoring tone to the atonic colon and abdominal muscles.

In the light of our more modern knowledge of the action of the hormone as the physiological exciter of intestinal peristalsis, it is not impossible that the undoubted clinical results obtained in the treatment of atonic constipation by electricity may be explained in another manner than by the stimulating action upon the involuntary muscular

fibres of the intestine, an explanation which, always unsatisfactory and unconvincing, is unnecessary if we make the reasonable assumption that the subjection of the intestinal mucosa to the powerful stimulation of the sinusoidal current ought to increase the production of that hormone.

Hydropathy. — The principle of all hydrotherapeutic measures which can be relied upon to improve the tone of the intestinal musculature is the impinging of a jet or spray, the temperature of which is rapidly alternated, more or less forcibly, upon the surface of the abdomen. One of the most efficacious of these is known as the Scottish douche. Unfortunately these methods of treatment require special and costly appliances which render them almost prohibitive outside a sanatorium or institution especially fitted for this method of treatment. They do not come into the scope of the medical man in ordinary practice for whom this book is written. If, however, one of his patients is in circumstances in which such treatment is available, he may be allowed a course of external hydropathic measures, but all *internal* douches must be absolutely forbidden. Irrigation of the bowel is one of the most important weapons in our armamentarium for acting upon the mucous membrane of the intestine and restoring it to a healthy condition. But it requires to be administered, in selected cases only, with the greatest

caution, and invariably for the first few weeks by the hand of the physician himself (or by a nurse specially trained by him), and the *amount, duration, temperature, and composition* of the douche prescribed, and dispensed with as much care and attention to detail as the drugs which the patient is taking by the mouth. And all these factors must be adjusted from day to day according to the effect produced. As a rule these irrigations are given during the first three or four weeks of treatment under the doctor's direct supervision. At the end of this time one will have learnt exactly the way the intestine reacts to irrigation, and the procedure will have been so systematised for that particular patient that afterwards he will be able to give himself the irrigation with perfect success.

In fact if the patient is unwilling or unable to commence his treatment in this manner it is best to abandon altogether the idea of irrigation, and prescribe for him the next best form of treatment, in which case, of course, recovery may take much longer. Imperfect or improper intestinal irrigation is worse than none at all.

At the Spas where intestinal douches are given as part of the routine, they are as a rule administered without that attention to detail by which alone success is secured; moreover, the water of the place is unsuitable in many cases.

One must bear in mind that the revenue of a

medicinal Spa is derived from the use of the natural water of that Spa in the form of douches, baths, and beverages. It is in fact the merchandise which the Spa has to sell. There is only one water, there are many patients; an attempt is made therefore to fit each patient to the water, a procedure strongly reminiscent of the famous method of Procrustes and hardly less disastrous.

Thus, without any dishonesty on the part of the prescriber and with the best intentions, it somehow happens that all the patients under treatment at any particular Spa are taking the water. But whether they receive benefit or the reverse depends upon *whether their cases are suitable for treatment by the water or not.*

We have seen cases of ordinary atonic constipation in the first stage go to a certain English Spa, and after having received a vigorous course of bowel douching with strong sulphur water return with a well-marked colitis from which they did not recover.

Of course, if the patients had in the first instance consulted the Spa physicians they would have been informed that their condition was not suitable for irrigations of that water and all would be well. But patients staying for a few weeks in such a Spa go to the bath-house as a matter of course and have a series of douches from the attendants, thus saving, as they think, the ex-

pense of consulting the physician. The attendants, in a spirit of loyalty to the place, naturally believe that their own particular water is a panacea, and assure the visitor that it will do good and that they have seen innumerable cases cured by it. This is doubtless true, but there is no guarantee that they were cases of the same nature, and the chances of the diseases being in exactly the same stage and the reaction of the patient being precisely similar will be very small. (We have even known people in perfect health, of such incredible foolishness that they have thought the opportunity of staying at a Spa too good to be thrown away, and have undertaken a "cure" as if it were possible in this way to increase the balance of health so to speak, and in the future to draw upon it!)

We reach then this practical decision. If a patient with chronic colitis happens to be going to visit a Spa or hydropathic institution we may allow him to have external douches, needle baths and spray, packs also (*vide* p. 201), but on no account to have irrigation of the intestine.

D. THE RELIEF OF PAIN AND SPASM, AND FLATULENCE

Sedative drugs are required in the management of chronic colitis for the relief of spasm and of the many disagreeable sensations which

cause so much annoyance. Many different drugs have been recommended by different authors for this purpose, amongst which we may mention *cannabis indica*, *assafoetida*, *carraway*, *belladonna*, *menthol*, *valerian*, *fennel*, *camphor*, *bromides*, *chloral*, *galbanum*, *castoreum*, and *musk*. Of these, the most commonly used at the present are *belladonna*, *menthol*, and *valerian*, and less frequently, the *bromides*. In cases in which there is a great deal of pain, we may add to this list *opium* and its derivatives. The *carminatives* are also very useful in the form of tea or tisane.

Belladonna.—This is the great remedy for functional spasm of the intestine. It may be given in the form of the extract or of the tincture. Mummery¹ gives a formula for which he claims some very good results:—

R.

Tinc. Hyoseyami	.	.	.	.	ʒss.
Tinc. Belladon	.	.	.	.	m. vi.
Sod. Bicarb.	.	.	.	.	gr. xx.
Tinc. Zingib	.	.	.	.	m. xv.
Spt. Chloroform	.	.	.	.	m. xx.
Aq. Menth. Pip.	.	.	.	.	ad. ʒi.

Sig. Two tablespoonfuls two or three times daily.

Personally we prefer to give the *belladonna* in the form of a pill.

R.

Ext. Belladon	.	.	.	.	gr. $\frac{1}{16}$ – gr. $\frac{1}{8}$
Ft. Pil. 1.	Ter die sumend.				

¹ Mummery, *Diseases of the Colon*, p. 141. London, 1910.

Valerian is an extremely valuable drug for this condition and does not receive the credit which is its due, except among specialists on diseases of the intestines who are fully appreciative of its virtues. It is best given in pill form, a convenient prescription being a mixture of the extract and powdered root. Thus:—

Rx.

Ext. Valerian	.	.	.	.	.	gr. i.
Pulv. Valerian Rad.	.	.	.	.	.	gr. ij.
Ft. Pil. Ter die sumend.						

Menthol may be given in doses of $\frac{1}{20}$ —2 grains, and has a remarkable power in relieving painful conditions of the intestine. In order that it may have no action upon the stomach it should be given in pills coated with keratin. A favourite pill combines the three drugs:—

Rx.

Ext. Belladon.	.	.	gr. $\frac{1}{20}$ — $\frac{1}{10}$
Menthol	.	.	gr. $\frac{1}{4}$ —1.
Ext. Valerian.	.	.	gr. 1—2.
Pulv. Valerian	.	.	gr. i. Ft. Pil. 1. Keratin coat.
cap. 1 ter die.			

A comparatively recent preparation, *Validol* may be mentioned here. It is a valerianate of menthol, and it may often be administered with good results in the various discomforts met with in chronic colitis. It may be given on sugar or in capsules.

A somewhat similar preparation is *Valyl*

(Hoechst), which is a clear white neutral liquid, boiling at 210 degrees, of pepper-like odour and soluble in twenty-five parts water. It is obtainable in capsules.

Carbon Dioxide.¹—The use of this agent as a direct application to the intestinal mucous membrane is by no means new, having been used by Hey as far back as 1736. Withering, Percival, Dobson, Wanan, Macbride, Ingenhauz, and Beddoes are mentioned as others who employed it mainly by injecting it into the rectum. Percival, for instance, treated cases of phthisis in this manner and claimed to have obtained good results. Together with Withering he treated cancerous ulcers by exposure to the gas and found relief of pain, diminution of pus, and a healthier appearance of the ulcer to result. Beddoes and Ingenhauz endorsed its analgesic properties. Following the latter's observations, carbonic acid gas was extensively used in France for some years as a palliative in malignant ulcers. It has since been employed in a variety of conditions. In 1863, Kuester and Perkin (Soberheim's *Arzneimittel-lehre*) treated cases of dysentery. In 1883, Achilles Rose of New York successfully treated a case of ulcerative proctitis, the results being published in the *Annals of Anatomy and Surgery*,

¹ The historical information is taken from *Carbonic Acid in Medicine*, by Rose. Funk & Wagnalls, New York and London, 1905.

Dec. 1883. In 1900, the same physician applied it with success in a case of muco-membranous colitis.

We have of recent date used carbonic gas fairly extensively in cases of chronic colitis and are convinced of its utility, especially in those cases in which there is a good deal of intestinal spasm accompanied by relative looseness of the bowels. The action of the gas is distinctly analgesic, it appears to stimulate the repair of ulcerated surfaces and it certainly appears to reduce intestinal putrefaction, possibly by inhibiting the growth of aërobes. In this connection the suggestion is pertinent that a similar use of oxygen would inhibit the growth of the anaërobic organisms.

The apparatus required consists of a cylinder of liquefied carbonic acid gas, a single bellows of an atomiser, a Clover's gas bag, and an enema nozzle with the necessary connections.

The gas bag is partly filled from the cylinder and attached to the valve end of the atomiser bellows, the distal extremity of which terminates in one of Herschell's aluminium self-retaining nozzles.¹ The patient lies upon his left side upon a couch and the nozzle is introduced beyond the sphincter. The gas is then introduced by gentle successive pressures of the bellows. The introduction of the gas must be extremely gradual and its entrance into the colon checked by con-

¹ Made by Allen & Hanbury, Wigmore Street, London.

tinual abdominal palpation. No pain should be produced and on the slightest sign of discomfort the introduction of the gas is temporarily discontinued. It will be found that any such discomfort always quickly passes away, the predominant sensation being that of slight warmth. After introduction of the gas, the patient should lie still and retain it for twenty minutes. By this time most of it will have been absorbed and whatever action it may produce will be at an end.

We usually employ such injections during the three or four weeks of treatment, and in most cases immediately after irrigation of the colon. As a matter of routine, the colon is irrigated, and then being quite empty is filled with carbonic acid gas or alternatively nebulised with menthol, oil of cloves, or oil of cinnamon. In other cases the different treatments are employed on alternate days. The advantage of immediately following the irrigation with treatment by nebula or gas is that any feeling of distress induced by the irrigation is abolished and the comfort of the patient much enhanced.

Electrical Treatment.—The following methods can be employed:—

1. *The Constant Current*, method of Doumer. An electrode is placed upon each iliac region and a current of from 5 to 30 milliampères is passed

with frequent reversals, gradually reducing the current to zero at each. This method not only relieves pain and spasm, but incidentally exercises a favourable effect upon the condition of the colon (*vide* p. 248, "specific treatment of colitis").

2. *High-tension Faradic Current*.—In this method, a current is produced by an induction coil which has at least 2000 yards of No. 36 wire on the secondary coil. The intensity is such that Giesler's tubes are stratified. This method was introduced into practice by Boardman Reed.¹

3. *Static Electricity*.—The patient is placed upon an insulated platform and the breeze and spray are directed upon the iliac regions, care being taken not to cause sparking.

The "wave current" has also been used with success, but its action is rather that of a general tonic.

Application of Heat.—We must not forget that in the application of heat we have a very potent means of relieving abdominal distress, of especial value in the early stages of chronic colitis. Beginning with the simplest method of its application and proceeding to the more elaborate application of it there are:—

(a) *Hot Compresses*.—Flannel wrung out in

¹ For particulars as to the apparatus and technique, the reader is referred to "Electrical Methods in the Treatment of Affections of the Stomach and Intestine."

hot water and applied to the surface of the abdomen in the usual manner. The advantage of this simple treatment is that the materials are always ready in every household so that no delay need occur. In the more serious treatment of chronic colitis as practised in nursing homes under the physician's immediate observation, it has been largely superseded by—

(b) *The Electric Pad*.—This is a pad containing a resistance embedded in asbestos. It has merely to be connected to the household electric supply to become hot and remain at a given fixed temperature as long as required. It can be used dry or be covered with a moistened cloth. In this latter manner it offers all the advantages of a hot compress without the drawback of requiring to be wrung out in water at frequent intervals; moreover, the temperature remains constant and does not decrease progressively as in the case of a compress.

(c) *The Light Bath*.—In one form an arc lamp being placed within a parabolic reflector throws a beam of light upon the abdomen of the patient who is sitting in front of it. The result is that a powerful thermic effect is produced upon the tissues and will in most cases rapidly dispel local pain and uneasiness. A series of light baths is frequently very useful at the commencement of a course of treatment.

To relieve flatulence it is necessary first of

all to ascertain whether the distension is in the stomach or in the intestine.

Agents called carminatives which give temporary relief were practically the only resource in the olden days when the state of medical science rendered an exact diagnosis, as we now understand the term, impossible. They are, it must be added, still useful as a temporary measure.

Scientific treatment should of course be directed to the cause of the flatulence. The commoner circumstances in which flatulence is encountered are the following, most excellently tabulated by Sydney Martin:—

1. Accumulation of small quantities of gas, chiefly carbonic acid, which are generated from time to time in the stomach and small intestine, and not being absorbed nor being propelled onward owing to motor defect in the organs are eructated often towards the close of the day. Common in middle and old age.

2. Air swallowed with food and saliva.

3. Swallowed saliva, decomposed by the gastric juice, setting free CO_2 .

4. Regurgitation of pancreatic juice into the stomach, where it is decomposed. Very frequent and overlooked in flaccidity of stomach walls and patency of the pylorus.

5. Bacterial fermentation in the stomach.

6. Fermentation in the intestine. More likely

to occur when the gastric contents are passed into intestine in a condition of sub-acidity.

7. Exchange of gases between the blood and the contents of the stomach. Sudden evolution of gas in neurotic individuals during severe pain, as migraine, biliary or renal colic.

Having ascertained which of these conditions is present it is not difficult to devise appropriate treatment. The management of bacterial fermentation in the stomach is discussed upon p. 121. Whilst we are applying the treatment which is indicated by the conditions present we may legitimately employ carminatives as temporary expedients to give the patient the relief which he craves.

The method of action of carminatives is unknown. Those of us who have dispensed our own medicine are all familiar with the old dodge of getting rid of froth in a bottle. The occasion generally arose when we were making up a bottle of senega mixture, and, on inadvertently shaking it, the whole of the upper part of the bottle would fill with froth preventing the complete filling. A drop of ether caused the froth to sink down as if by magic. And we can presume that the same thing happens in the human stomach. As a matter of fact, a few drops of ether is one of the best methods of temporarily expelling flatulence. Most of the essential oils appear to have much the

same effect and may be similarly employed for the relief of flatulence. Oil of cajuput, oil of rue, and oil of peppermint appear to be the most efficacious : they may be given on a lump of sugar, in the form of a hot infusion made from the dried leaves, or in the aquæ of the B. P.

Lycopodium, used as a remedy for flatulence by the homœopaths for many years, evidently depends for its action upon the essential oil it contains. When given in the form of the powder met with in the allopathic shops it is inert ; but triturated with sugar of milk (which causes the capsules to burst and allows the oil to escape) it certainly has some therapeutic effect.

Validol, already mentioned, is an excellent carminative. Carbolic acid taken into the stomach is a direct sedative in addition to its antiseptic action, and may usefully be combined with the carminatives.

E. REDUCTION IN THE AMOUNT OF FERMENTATION OR PUTREFACTION IN THE INTESTINE AND THE REMOVAL OF IRRITATING SUBSTANCES

For the sake of abbreviation we intend hereafter to describe these processes as Disinfection of the Intestine, a convenient and descriptive phrase notwithstanding the obvious objection that the

methods described cannot produce a result in any way comparable to a true disinfection.

Whenever, from the symptoms and objective findings (*vide* section on Diagnosis, p. 96), there is reason to believe that fermentation or putrefaction in the intestine is in excess with the consequent production of auto-intoxication, attempts must be made to reduce these processes. There are several means at our disposal by which this can be accomplished more or less efficiently.

1. The intestines may be supplied with the kind of food residues upon which the microbes cannot flourish.

2. Such a medium may be favourable to other organisms which we can introduce to become acclimatised and vanquish those which are causing the disturbance.

3. The offending organisms and their irritating products may be eliminated by purgatives or by lavage, or—

4. The bacterial growth may be retarded or inhibited by the introduction of drugs into the intestine.

It is a matter of common knowledge that the bacteria inhabiting the alimentary tract may be roughly divided into, aërobes which require oxygen for their existence and anaërobes which cannot live in oxygen. Again speaking generally, the aërobes live on carbohydrates an abnormal fermentation

of which indicates excess in the intestine. The anaërobes live upon proteins, and when in excess give rise to the well-recognised products of putrefaction.

The method of disinfecting the intestine consists in determining which of these two groups is present in excess in the intestine and responsible for the abnormal processes occurring there, and then, having obtained this information, to adopt the appropriate treatment of starving them out. This is actually the secret which is at the bottom of the remarkable success of the so-called Salisbury treatment which consists in limiting the diet of the patient entirely to beefsteak and water for some weeks. Dr. Salisbury's treatment was a triumph of empiricism. He had found out experimentally that when the patient's intestine was in a condition of fermentation the adoption of this diet led to a speedy recovery. Of course in those cases in which the trouble happened to be due to putrefaction of proteins the treatment utterly failed, in fact the patients became worse. But these cases were not heard of, and the wonderful success of the régime in carbohydrate fermentation was sufficient to give the treatment a firm reputation. It is still exploited by a host of charlatans whom the law of this land has no power to prevent from practising medicine without a license, and who, whilst ignorant of the funda-

mental principles upon which this treatment depends, effect wonderful cures and naturally have some remarkable failures. The average medical man as a rule leaves the treatment severely alone.

The identification of the intestinal condition present will be quite an easy matter to those readers who have studied the section upon Diagnosis. If there is a condition of saccharolytic fermentation in the intestine, the institution of a diet consisting entirely of meat (as in the Salisbury diet) for a short time will effectually kill off all the bacteria which live upon starch and sugar. Similarly, a diet limited entirely to carbohydrates will produce a milieu fatal to those micro-organisms which live upon protein substances. We have thus the whole field of the growth of the intestinal flora under complete control. And, as Kolbe¹ has pointed out, individual food dosage and the quantitative reduction of food even, if necessary, to the extent of total abstinence for a time from all nourishment except water, is a more active and less debilitating method of treating alimentary auto-intoxications than the most energetic purgation or the use of intestinal antiseptics.

Disinfection of the intestine by dietetic means is referred to by Combe² in the following terms:—

¹ Kolbe, *Examen fonctionnel de l'intestin dans la pratique journalière*. Paris, Doin, 1909.

² Combe, *L'Auto-intoxication*.

“Although the general scheme of treatment by diet is simple and clear, the actual manipulation of the details calls for some judgment and discretion. For example, in the case of the majority of patients with chronic colitis, anaërobes are in excess and a non-protein diet is required until the anaërobes are eliminated. When this stage is reached proteins must gradually be added, for the persistence in a non-protein diet will in itself lead to intestinal disturbance. Such medication by diet is a fascinating method of treatment, but unfortunately, although much may be occasionally effected, it is rarely possible to achieve the result desired and various supplementary methods have to be requisitioned.”

Lactic Acid Therapy.—By means of the acclimatisation of the several lactic acid producing bacilli we can not only produce practically the same results as are obtained by a diet consisting entirely of carbohydrates but we can do so in a shorter time and without demanding so much self-denial on the part of the patient. We may also make use of this method in addition to regulation of the diet.

Lactic acid therapy is at present suffering from the unmerited neglect which inevitably follows a boom during which a method of treatment is adopted as a panacea. Treatment by the administration of lactic acid bacilli is extremely valuable in

a small class of cases of colitis characterised by alkaline stools and excess of proteolytic bacteria.

It is hardly necessary to recall the details of the introduction of the Lactic Acid treatment. The circumstances of its striking début soon suggested to manufacturers a splendid field for commercial enterprise. Every advertising device was employed, doctors were encouraged to prescribe the remedy, and "popular literature" explained to the laity the possibility of treating themselves. A colossal number of failures inevitably ensued; the reaction took place and has caused (temporarily at least) an almost complete abandonment of a method of treatment which in suitable cases can do a great deal of good. Lactic acid bacilli continue to be as useful as ever they were in suitable cases and will doubtless continue to be prescribed by some few physicians who are familiar with their advantages. They can never come into really extensive use, as a bacteriological examination of the stools is necessary before one can ascertain whether they are suitable or not for the case in hand.

It is unfair to condemn a method which has failed in cases the unsuitability of which would have been manifest on a little consideration. The treatment of constipation by soured milk and lactic acid bacilli is a case in point. The majority of cases cannot possibly be benefited, yet such failures

give rise to the expressions of disparagement which occur in medical reports that "it has been extensively tried in cases of constipation and has not carried out its promise." It really failed only in the cases in which it ought never to have been tried.

As a matter of fact its use in constipation should be limited to cases in which the natural stimulus of the fæces is defective either from deficient bulk, deficiency in cellulose, or ineffective bacterial action. In these the result is often very satisfactory, the lactic acid produced acting as an efficient exciter of peristalsis.

A little reflection will show that no amount of lactic acid bacilli acclimatised in the intestine can increase the power of the abdominal muscles or restore the tone of a weakened muscular coat of an intestine or supply an absent rectal reflex or empty a dilated sigmoid, and that to give it in such cases of constipation is simply to invite failure.

Therefore a proper diagnosis must be made before prescribing, and the lactic ferment treatment adopted only in the group of cases characterised by deficiency in the acids and gases which form the natural stimulus to the action of the bowels or by a real defect in the absolute amount excreted. In these cases brilliant results may be expected for brilliant results generally occur. Similarly, in cases of intestinal auto-intoxication it must be established with certainty

that the trouble is the result of an abnormal growth of proteolytes and not of saccharolytes, or we shall certainly not only do no good to the patient but be wasting the time which should be more profitably employed in more suitable methods of treatment. In cases suitable for lactic acid therapy, the stools will be alkaline with an excess of Gram Positive organisms.

As milk is as a rule contra-indicated in chronic colitis, it is best not to administer soured milk to a patient but to give a daily dose of a pure culture. This is best taken before breakfast, when the stomach is empty, in half a glass of sweetened water; in this manner the bacteria escape destruction by the gastric juice. Dried cultures which were so extensively advertised in the form of tablets are probably in most cases inert. A liquid culture should be obtained from a reliable laboratory put up in sealed bottles, the whole being consumed within a few days of manufacture. Oppenheimer (Lactigen) and Martindale (Trilactine) both supply reliable ferments.

Purgatives.—A good purge will most effectually clear the intestine of fermenting and putrefactive material, but in colitis we are practically limited to castor oil as the other cathartics are of too irritating a nature. In some cases use may be made of the saline purgatives given in a moderate dose three or four times a day.

It is important to bear in mind that both castor oil and saline purgatives greatly increase auto-intoxication for some hours the excretion of ethereal sulphates rising very considerably; it then commences to fall until it is reduced much below normal. The explanation of this is of course very simple: the purgative stirs up the intestinal contents and the toxins are absorbed into the circulation.

Irrigation of the Bowel.—Combe¹ has pointed out that the putrefaction produced by proteolytic organisms occurs only in the large intestine; and as we are able to wash it out most efficiently as far as the cæcum, enteroclysis supplies a potent means of improving the condition of affairs. He also draws attention to the circumstance that all the water introduced does not return but that some is retained to be excreted by the kidneys to assist in the expulsion of some of the toxins which have been already absorbed. Enteroclysis is also useful to remove large quantities of irritating mucus. Unfortunately, as Mathieu² observes, lavage of the intestine has been very much abused, and its indiscriminate application has led to its use in cases where there has really been no valid indication for its employment either from the evidence of auto-intoxication or from the amount of mucus.

¹ Combe, *L'Auto-intoxication*, page 513.

² Mathieu, *op. cit.*, p. 496.

In this country the abuse of lavage especially takes place at Spas where patients believing themselves to be suffering from colitis frequently subject themselves to a very thorough lavage of the bowel with strong sulphur water upon their own responsibility or the advice of the bath attendant.

Enemata are most rationally indicated in the treatment of subacute colitis associated with looseness of the bowels and the passage of offensive stools, and in the temporary exacerbations and relapses which are so commonly met with in the course of chronic colitis. They are not so suitable as irrigation for the routine treatment of uncomplicated chronic colitis.

As we have already pointed out, the amount of fermentation and putrefaction in the intestine may be greatly reduced by means of alterations in the diet; but sufficient toxins will still be produced to impair the health of the patient, and we require to make use of other means to get rid of them and prevent their absorption. Of these means, the most important from a practical point of view is irrigation of the bowel, which can very rarely be dispensed with in the treatment of any but the very mildest cases of chronic colitis. But in the first place it is necessary that the reader should have a clear idea of the difference between enemata and irrigation, as they are often confounded by those who have

not specially studied the subject. In an enema, a quantity of liquid is introduced into the bowel, retained for a certain time, and then evacuated, the object being simply to empty the bowel of its contents. Two kinds of enemata are in use, the high and the low. In the high enema, either by using a long tube or by modifying the position of the patient, the whole of the colon and cæcum is filled with liquid. In the low enema, only sufficient is introduced to fill the rectum and lower part of the pelvic colon beyond which the liquid does not go. Irrigation of the bowel is a more thorough cleansing, the liquid which is introduced is *at once* evacuated, fresh is introduced and evacuated, and so on, the object being to wash the bowel clean from toxins and irritating substances. By means of a double tube a stream of water can be arranged to flow continuously over the surface of the intestine.

Opinions are rather divided as to the merits of the long tube. Certain authorities claim that they are able to introduce a tube far up into the colon, whilst others deny the practicability of this and maintain that with a short tube and a correct position of the patient equally good results will be obtained. We cannot make these points clearer than by quoting an opinion from each side.

Combe,¹ who is an advocate of the long

¹ Combe, *L'Auto-intoxication*, p. 516. Paris, 1907.

tube, gives the following directions for its introduction. (The following translation is slightly condensed.)

“I use a long tube 5 to 8 millimetres in diameter, 50 centimetres long for children and 1 metre for adults.

“This tube is connected with a douche-can holding two quarts placed at most 10 centimetres above the buttocks of the patient, who is lying on his right side with his knees drawn up and his buttocks raised.

“The tap having been opened, one introduces the tube 1 or 2 centimetres within the rectum. The water flows and opens the intestine in front of the tube, it is then easy in a minute to push the tube on a couple of centimetres. Introducing the tube thus slowly centimetre by centimetre, waiting on each occasion until the water opens a way for it, one manages easily to introduce the whole of the tube and the water as far as the cæcum without the patient feeling the least pain.”

For the opposition we quote Kemp,¹ a recognised authority upon the subject.

“We no longer use the colon tube in enteroclysis, but the rectal irrigator, in conjunction with placing the patient in proper position. One can

¹ Kemp, *Enteroclysis, Hypodermoclysis, and Infusion*, p. 81. New York.

wash the bowel as thoroughly with the 5-inch tube by this method as with the colon tube. In this connection we would call attention to the following: The adult rectum averages 8 inches in length and the adult sigmoid $17\frac{1}{2}$ inches. The mesentery of the sigmoid is often very long, allowing that viscus to be readily pushed up. Thus to enter the descending colon where it joins the sigmoid flexure a rectal tube 28 to 30 inches long is necessary."

It seems a curious fallacy, but we hear prominent physicians in our well-known Society meetings describe entering the colon (even the transverse colon) with the average rectal tube. Such a tube is 18 inches or at most 2 feet in length.

Disinfection of the Intestine by Means of Drugs.—It may be said at once that it is impossible to arrest abnormal fermentative and putrefactive processes in the intestines by any drug given by the mouth, as a dose sufficiently large for this purpose cannot be administered without danger to the patient. But although an abnormal bacterial growth in the intestine cannot be entirely destroyed, one can so effectually inhibit its proliferation as greatly to improve the condition of the patient, especially when other measures are used in conjunction. More particularly is this the case when the intestinal

trouble is the direct consequence of irritating material which enters it from the stomach, as this organ is much more accessible and can easily be cleansed by the use of certain drugs in combination with lavage.

Three medicaments introduced by Robin¹ are of especial value.

Fluoride of Ammonium.—This drug is employed in breweries and distilleries to inhibit lactic acid fermentation, which it does in a solution of 1 : 1000. It does not inhibit the action of saliva or the gastric and pancreatic juices even in 1 : 100 solution, a strength which destroys the cholera bacillus, the staphylococcus pyogenes aureus, the bacillus butyricus, the colon bacillus, and the bacillus anthracis. Fluorides appear to be only slightly toxic—Tappeiner gives the fatal dose for dogs as 0·15 gr. per kilo bodyweight—and are mostly eliminated in the urine. Robin orders one tablespoonful of the following solution to be taken at the end of a meal, corresponding to a daily dose of 0·02 gr. in the twenty-four hours, the toxic dose being 8·32 per kilo bodyweight for intravenous injection :—

Ammonii Fluoridi	.	.	.	.	0·20 gramme.
Aq. Dest.	.	.	.	.	300.

The effect upon the patient is not only greatly to diminish the acids of fermentation but to im-

¹ Robin, *Les Maladies de l'Estomac*, p. 481. Paris, 1904.

prove the gastric digestion of albuminoids and starches.

Double Iodide of Bismuth and Cinchonidine.—Bismuthum Cinchonidin iodidum. Dose $\frac{1}{6}$ to 1 grain. This is a yellowish red powder insoluble in ordinary solvents but having the power to decompose slowly in alkaline media. It is especially useful in cases of gastric fermentation, especially of butyric acid accompanied by evil-smelling breath. $\frac{1}{3}$ to 1 grain may be given in a cachet with an equal amount of fluoride of calcium and $1\frac{1}{2}$ grains of prepared chalk.

Iodide of Sulphur.—This drug, prepared by Prunier, is exceedingly useful in cases attended with extreme flatulence which is the result of fermentation and not of air swallowing. It may be given in cachets in a dose of $1\frac{1}{2}$ to 5 grains before meals.

Combe¹ divides intestinal antiseptics into two groups: (1) Specific antiseptics such as calomel, and (2) Secondary antiseptics. The latter he subdivides into four main groups according as their base is creosote, salicylic acid, naphthol or ichthyol.

Calomel. This, if it can be tolerated, appears to be the most certain of all intestinal antiseptics. Many observers have demonstrated that it greatly diminishes the excretion in the urine of aromatic sulphates—the microbes under its influence are

¹ Combe, *L'Auto-intoxication*, p. 496.

unable to effect the change of the biliverdin of the bile into hydrobilirubin, and the stools consequently lack the brown colour normally present. The antiseptic effect is probably produced through the transformation of some of the calomel into an oxide of mercury by the alkaline contents of the intestine.

Antiseptics with Creosote Base.—Creosote itself is very irritating to the stomach even in solution in oil (creosoted cod-liver oil being the least irritating). Fortunately modern chemistry has provided creosote compounds which are insoluble in the stomach but which on reaching the intestines are split up with the liberation of creosote. Of these we have:

Creosote Carbonate (Van Heyden). A colourless liquid given in doses of 5 to 20 minims.

Guaiacol Carbonate. White crystals insoluble in water. Dose 10 grains.

Guaiacol Valerianate. White insoluble crystals. Dose 5 to 15 grains.

Thiocol. White crystals soluble in water. Dose 15 grains.

Antiseptics with Salicylic Base:—

Salicylate of soda.

Salol. (Salicylate of phenyl.)

Salacetol. (Acetyl-methyl-salicylate.)

Aspirin. (Acetyl-salicylic acid.)

Bismuth Salicylate.

Magnesium Salicylate.

All these split up in the intestine liberating the active salicylic portion. Combe himself strongly recommends salacetol, of which he gives a dose of $\frac{1}{2}$ to 1 gram at 10 A.M. and 4 P.M.

Antiseptics with Naphthol Base.—These include—

Benzonaphthol. Dose 4 to 10 grains. This must be given in keratin-coated capsules as it has an irritating action on the stomach.

Orphol. This is naphthol-bismuth, an insoluble powder which is split up in the intestines and is the most eligible method of administering the drug.

Biscols-Fraudin. A French preparation which contains naphthol in combination with charcoal, and is usually well tolerated.

Antiseptics containing Ichthyol.—We may give ichthyol itself in the form of a mixture.

Ammonium Ichthyol and Lithium Ichthyol. Dose 2 to 4 grains in capsule.

Ichthalbin. An insoluble powder. Dose up to 15 grains.

Ichthoform. An insoluble powder in doses up to 5 grains.

Combe sums up as follows:—

If the stomach is primarily at fault one gives hydrochloric acid or menthol or thioform according to the case: if the intestine, salacetol, ichthyoform, or creosoted oil are indicated according to the case.

If a rapid and energetic disinfection of the whole digestive tube is desired, calomel is given.

One of the most efficient intestinal antiseptics which, however, has received very little application, is peroxide of hydrogen. Schmidt¹ found that a small dose caused an increase of the natural intestinal secretion without producing any irritation. The difficulty of preventing its reduction before reaching the intestine he found could be overcome by combining it with agar which takes up from 10 to 12 per cent.

A preparation, peroxide of magnesium, is obtainable commercially. It appears to act as an efficient intestinal antiseptic by liberating peroxide of hydrogen in the intestine. It has been placed on the market under the trade name of Hopogan, in the form of tablets of which from one to three may be taken daily. Tablets containing an especially high percentage of peroxide can also be obtained to order.

Beta naphthol is another efficient intestinal antiseptic; but as it is a gastric irritant it must be given in keratin-coated capsules in order that it may pass through the stomach.

Charcoal.—Carbo vegetabilis was recommended originally by Bouchard, who prescribed it as a matter of routine in the cases which he assumed

¹ Schmidt, *Mediz. Klinik*, March 28, 1909.

to be due to auto-intoxication.¹ His formula consisted of the following:—

Carbo veg.	.	.	.	.	100 grammes.
Iodoform	.	.	.	.	1 „
Naphthalin	.	.	.	.	5 „
Glycerin	.	.	.	.	200 „
Peptone	.	.	.	.	50 „

The dose was a tablespoonful in water three times a day.

Charcoal was suggested as a remedy because of its capability of absorbing many times its bulk of gas. But the fact was overlooked that this was only true of *dry* charcoal and that when wet it had no such action. Nevertheless there is abundant clinical evidence that charcoal is of considerable use in the treatment of flatulent conditions presumably from some dynamic action which it exerts upon the body. In addition, it certainly fixes the toxic material, the colouring matter, and the alkaloids in the fæces and prevents these from entering the urine.

F. SPECIFIC TREATMENT OF THE COLITIS

The methods of treatment which we have described up to the present have been mainly to meet appropriate indications. The prescription of an appropriate diet which excludes everything

¹ Bouchard, *Auto-intoxication in Disease*, 1894.

which can irritate the mucous membrane of the intestine, the provision of a daily action of the bowels, the removal of irritating intestinal contents, the inhibition of the growth of injurious microbes, can each and all work together for good. We now come to consider whether there is any method of treatment which will act curatively upon the intestinal mucosa. Is there in fact any agent which can be employed to act directly upon the irritated area?

Unquestionably we have at our disposal in the following procedures means by which we can produce definite results.

- (a) Irrigation with water and watery solutions.
- (b) Application of nebulæ.
- (c) Application of gases.
- (d) Oil enemata.
- (e) Electricity.
- (f) Vaccines.
- (g) Drugs.

(a) *Irrigation with Water and Aqueous Solutions.*—Irrigation has already been mentioned as a method of cleansing the intestine and removing irritating substances from the bowels. Irrigation affords an opportunity of applying medicinal substances which can modify the condition of the intestinal mucosa.

The Technique of Irrigation.

Irrigation may be performed with a single tube using a two-way tap apparatus or its equivalent, or by means of a simple funnel and tube or with a double-current rectal tube.

The two-way tap apparatus consists of a douche-can and a two-way tap, one arm of which is attached to the douche-can by means of a rubber tube, another arm terminates in a No. 10 Gentile stomach tube with terminal and lateral eyes, whilst the remaining arm enters a third rubber tube which leads into a receptacle standing on the floor beside the bed.

The patient lies on his left side and the end of the stomach tube is introduced into the rectum for about four inches. The douche-can is suspended a foot above the patient's buttocks and the tap is turned so as to allow liquid from the douche-can to enter the bowel. When the requisite amount has entered, the tap is turned into the second position which will allow the fluid to leave the bowel and pass into the receptacle upon the floor.

An equivalent apparatus may be extemporised by substituting a glass T tube for the two-way tap. Upon the tube leading to the douche-can and upon that passing into the pail spring clips are placed which normally keep the tubes shut and prevent anything passing. If the upper clip be

pressed, fluid will flow into the bowel. If the lower one is opened, fluid will escape from the bowel into the pail.

As regards the length of tube to be passed into the bowel the reader is referred to the remarks on p. 226.

A definite amount of fluid is allowed to enter the bowel and a definite amount allowed to leave, a certain pre-arranged quantity remaining in the bowel. To facilitate this, the douche-can should have a graduated glass front, and the exit pipe should pass into a large measure into which the liquid flows before it is turned into the pail which stands beside the bed.

The patient lying upon his left side with the hips well raised either by sand-bags or by a bed-rest, a pint or so of water is slowly introduced into the rectum. The patient is instructed to get up at once and empty the bowel as this preliminary douche is only designed to ensure that the bowel is empty. (If the bowels have been recently moved it may be omitted.)

The patient then resumes his position upon the bed, and the irrigation proper is commenced. If any difficulty is experienced in getting the fluid to pass up into the bowel it may be necessary to place the patient in the knee-chest position.

Irrigation with a simple funnel and tube is quite satisfactory but makes rather larger demands

upon the dexterity of the physician. The apparatus designed by one of us has already been described and figured on page 69. It should be roughly graduated by attaching a little piece of adhesive rubber plaster at the levels occupied by half a pint and a pint respectively. With correct technique it is quite easy to irrigate the bowel with a funnel and tube even single-handed, without it one is apt to bungle. It will therefore be best to go rather thoroughly into what at first sight will appear needless minutiae.

The patient lies on his left side upon the bed in the correct position; the operator sits down beside him, inserts the rubber tube into the rectum, and retains it in position with the left hand whilst with the right he holds the funnel on a level with the buttocks of the patient. The nurse then pours the fluid used for irrigation into the funnel up to the half pint mark. The operator raises the funnel until he sees that the fluid is commencing to flow. At the first sign of discomfort he lowers it, and again raises it as soon as the discomfort has passed off. The nurse then pours a second half pint into the funnel and this in its turn is allowed to flow into the bowel. The operator now lowers the funnel whereupon the liquid will commence to flow back into it. If it is decided to leave half a pint in the bowel, as soon as the liquid reaches the half pint mark on the funnel the operator

nips the rubber tube with the left finger and thumb to prevent any more fluid passing out, and empties the funnel into the toilet pail which is standing beside the bed. The process is repeated until it is considered that the bowel has been sufficiently irrigated. If the operator is single-handed he must have a small table at his right hand upon which he has placed the jugs containing the irrigating liquid, and he must retain the rubber tube in the bowel with the third and fourth fingers of the left hand, whilst with the thumb and forefinger he holds the funnel in order that he may pour the liquid into it.

Irrigation with a double current apparatus is of course quite different, the fluid continuously entering the bowel by one tube and leaving it by another. The principle is a very old one, many types of apparatus having been devised from time to time, notably by Bodenhamer, Clendenning, Martin, Skene, Tuttle, and Kemp. Of these Kemp's is one of the best known in America, and is made of either hard or soft rubber. As already mentioned (p. 225), Kemp advises the use of the short tube in irrigation.

In this country, a soft double current colon tube of French manufacture, as illustrated overleaf, is mostly used.

The irrigator, which is attached to two tubes, one passing to a douche-can or other reservoir

suspended above the patient and the other to the toilet pail which stands beside the bed, is well

lubricated and introduced with a gentle rotary motion, the tip being directed slightly backwards. The patient lies in either the dorsal or the left lateral position, with the hips well raised in either case. The inlet and outlet tubes are arranged so that the amount of fluid entering and that leaving the bowel are equal. If then a certain amount is allowed to enter the bowel before any outflow is permitted, this amount will remain permanently in contact with the intestinal mucosa but will be continually being changed. The effect of a continuous irrigation is thus obtained. The amount of fluid retained should vary from several ounces to a pint and a half, according to the extent of bowel which is being irrigated.

The whole of the intestine as far as the cæcum can be irrigated by means of Kemp's rotation method:¹—



FIG. 2.—DOUBLE CURRENT COLON TUBE

¹ Kemp, *Enteroclysis*, &c., p. 88.

(a) "Patient is placed on the left side with the hips elevated and the descending colon is irrigated freely.

(b) "Then rotate the patient gradually to the dorsal position, and then to the right side, with the hips elevated; the return tube being pinched, about a pint and a half of fluid is allowed to run into the bowel.

(c) "The shoulders are then elevated to above the level of the hips, the patient being still on the right side. This will make the fluid gravitate into the caput coli.

(d) "The shoulders are then depressed to below the hip level, the patient on the right side is gradually rotated to the dorsal position and then to the left side, &c. In other words, the process is reversed, the return tube is then let go and the fluid allowed to escape."

The temperature at which irrigation is performed depends entirely upon the nature of the case and the condition of the intestinal mucosa.

The fluid employed may be any of the following, according to the effect which it is desired to produce:—

Acid, tannic . . .	3i to the pint.
Alum . . .	3ss-3i to the pint.
Argyrol . . .	$\frac{1}{2}$ -1 per cent.
Bichloride of mercury . . .	1 in 10,000.
Borax . . .	3ss-3i to the quart.
Boric acid . . .	3i to the quart.

Flaxseed tea . . .	3ii flaxseed to 1 quart.	Boiled 30 minutes.
Hazeline . . .	3ii to the quart.	
Ichthyol . . .	10-15 grammes of a 1 per cent. solution to the litre.	
Listerine . . .	3i to a quart.	
Normal saline . . .		
Pot. permang. . .	3-10 grains to the quart.	
Quinine . . .	1 in 1000.	
Salicylic acid . . .	1 in 300.	
Sea-water rendered isotonic with blood serum.		
Sod. bicarb. . . .	3i to the quart.	
Tannigen . . .	0.2-0.5 per cent.	
Thymol . . .	1 in 2000.	
Zinc sulphocarbolate . .	15 grains to the quart.	

Mummery¹ draws attention to the dangers of irrigating with substances of a poisonous nature. "Considerable absorption occurs in the colon, and it is dangerous to put any fluid or dose of a drug into the colon that cannot safely be put into the stomach. . . . I have seen two cases of boracic acid poisoning, with a rash and vomiting, result from the use of boracic acid lotion for irrigation, and one case of carbolic acid poisoning from the use of weak lysol solution."

Normal saline solution is by far the safest solution for irrigation, and will often do everything which is required. An astringent effect can, if desired, be produced by stirring up in each quart a heaped up teaspoonful of bismuth subgallate or bismuth subnitrate, or of both.

¹ Mummery, *Diseases of the Colon*, p. 297. London, 1910.

As a rule, irrigation of the bowel should be used in the following circumstances:—

1. Invariably during the first three weeks of routine treatment of chronic colitis.
2. Whenever the bowels are habitually loose.
3. When there is evidence of ulceration.
4. When there is any considerable degree of auto-intoxication.

(b) *Application of Nebulæ or Atomised Oily Liquids to the Interior of the Intestines.*—The use of nebulised fluids of an oily nature or the application of medicated solutions in an atomised condition much finer than ordinary spray are of quite modern introduction and have hitherto been chiefly used as means of applying powerful drugs dissolved in an inert oily basis to the respiratory tract. The suggestion to apply them to the interior of the stomach was made by Turck, who, some twelve years ago, made use of oil of cinnamon, oil of cloves, and menthol. Nebulæ can also be used with advantage in intestinal conditions accompanied by pain and spasm. A nebulæ is quite different from an ordinary spray and is produced in quite a different manner. Whilst in a spray producer a current of air passing over the orifice of a tube whose lower end is immersed in the liquid draws up some of it and projects it in a spray or shower of fine drops, in a nebuliser a jet of the liquid to be atomised is propelled with

such force against the side of the vessel which contains it as to be mechanically broken up into a cloud of such tenuity that it will pass through a tube three feet or so in length and issue like smoke from the distal end. In this way so minute an amount is used that it is quite safe to employ powerful drugs. To apply nebulæ to the interior of the colon, it suffices to introduce a rubber stomach tube with a terminal eye and connect the other end to a Globe Nebuliser. It is then quite easy to fill the bowel with the nebula of any oily liquid desired. Oil of cinnamon, which is a powerful antiseptic, may be used either alone or mixed with oil of cloves or containing 10 per cent. of menthol. (Oil of cloves is a powerful disinfectant, said to be better for the hands than perchloride of mercury.) (Martindale, 14th edition, p. 698.)

(d) *Oil Enemata*.—Although introduced into practice a considerable time ago by Kussmaul and Fleiner, the treatment of constipation and of chronic colitis by the injection of olive oil has been much neglected in this country. It is without doubt by far the most important single measure of treatment which we possess. So much is this the case that if one were given the choice of a single method of treatment of chronic colitis—in addition, of course, to being allowed to order an appropriate diet—one would without hesitation choose oil injections, and with it one

would succeed in curing the majority of patients. The reason why it is not used in every case is that there are, from the patient's point of view, much pleasanter methods of treatment, and it is expensive and demands a troublesome manipulation. But in selected cases it is indispensable. It is found of the greatest use—

(a) To secure a daily action of the bowels during the first few days of treatment, before the agar or other means that the patient is employing to combat the constipation has had time to produce any effect (*vide* p. 183).

(b) In the treatment of chronic colitis cases which have reached the spastic stage.

The action of olive oil injections is as follows :

(a) To diminish the absorption of toxic substances through the walls of the intestines.

(b) To lubricate the walls of the intestines.

(c) To soften the stools, and

(d) The oil is split up to some extent by the intestinal secretion liberating fatty acids which form laxative cleansing soaps with the alkaline fluids with which they mix.

For the efficient administration of oil injections a certain technique is indispensable.

1. The oil must be free from acid impurities. Washed olive oil is the best.

2. It must be introduced under a very low pressure, therefore never by means of a Higgin-

son syringe but always by a douche-can which must not be suspended more than 18 inches above the level of the patient.

3. The oil must be at the right temperature.

4. The patient must be in the correct position.

Two different techniques are required according to whether it is desired to introduce the oil high up in the intestine or not. When a high injection is required, from 12 to 16 oz. of oil should be used for an adult and $1\frac{1}{2}$ to 5 oz. for a child. The patient should preferably be in a knee-chest position, the douche-can being hung about a foot above the buttocks. We have found the simple funnel most convenient and efficient, as the pressure under which the oil is introduced can be varied from time to time according to the manner in which it is seen to be entering the colon. A rubber tube of from 8 to 10 inches in length should be passed in order that the oil may enter the sigmoid without distending the rectal ampulla. At least twenty minutes should be occupied in introducing the oil. If the knee-chest position is found to be very troublesome, the patient may be placed in the left lateral position with the hips well raised and, after the injection has been completed, assume the knee-chest position for ten minutes or so.

These high injections are, as a rule, given in cases of obstinate constipation and are not in-

tended to be retained all night. If a stool has not been produced in four hours, an injection of hot flaxseed tea should be administered. This will rarely fail to bring about the desired result.

Generally, however, such a large injection is not required, but a moderate amount of oil is

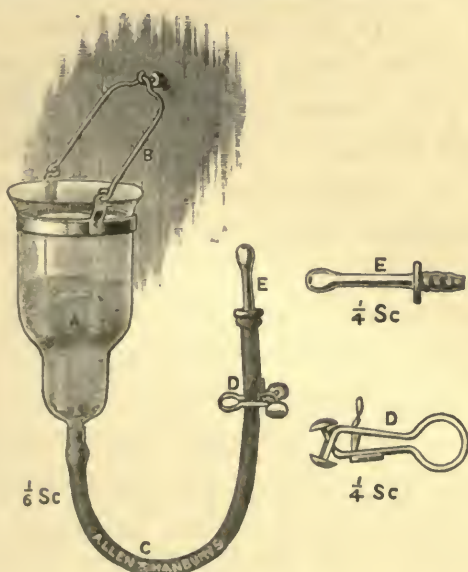


FIG. 3.—DR. HERSCHELL'S APPARATUS FOR OLIVE OIL INJECTIONS.

This has been especially designed to enable the patient to administer an injection to himself without assistance.

A. Funnel. B. Wire loop. C. Rubber tube. D. Laboratory clip. E. Special self-retaining aluminium nozzle.

introduced by the patient himself and retained all night. We shall therefore give the directions which we are in the habit of placing in the hands of the patient.

Apparatus required.—Dr. Herschell's funnel

apparatus for olive oil injections with clip and aluminium nozzle and 2 or 3 feet of tubing.¹ The funnel is provided with a wire loop by means of which it can be suspended from a hook. The aluminium nozzle is self-retaining, has a rounded end with which the patient cannot possibly injure himself, and a bore of very large calibre to allow the oil to flow freely. (The ordinary bone nozzle supplied with fountain syringes will hardly allow oil to pass through it.) A basin of hot water will also be required, and a bottle of olive oil. A thermometer should be obtained which will pass through the neck of the bottle. It is most convenient to use the oil as purchased in reputed quarter, half, or whole pint bottles. The reputed half-pint bottle holds only about 5 oz., and the pint only a little over half a pint. Much mess is avoided by injecting the entire contents of one of these bottles. The following are the directions:—

1. Stand the bottle of oil in the basin of hot water. When the thermometer in the oil registers 100° Fahr., take it out and wipe it with a towel.

2. Hang the funnel upon the knob of the door. See that the clip is in position to close the tube and as near the nozzle as possible.

3. Pour the oil into the funnel.

¹ Procurable at Allen & Hanbury's, Wigmore Street.

4. Lie down on your left side on the floor facing the door.

5. Insert the nozzle into the anus.

6. Squeeze the clip to allow the oil to flow. Keep your eye on the oil in the funnel and mark the level gradually subsiding as the oil enters the bowel.

7. When all the oil has entered the bowel take out the nozzle and place it in the funnel so that it cannot drip upon the carpet.

8. Assume the knee-chest position for five minutes.

9. Apply a ladies' sanitary towel to prevent any accidental soiling of the sheets and get into bed. Remember that any passage of wind will be accompanied by a spurt of oil, so avoid passing wind, and if you are obliged to do so hold a towel firmly pressed against the passage.

Performed in this manner the self-injection of olive oil presents absolutely no difficulties and should not be accompanied by the spilling of one drop of oil.

When injections of olive oil are given to keep the bowels open they should at first be given every night. As soon as a daily motion is obtained they may be given on alternate nights; later on every third night, and finally only on the evening of the day upon which the bowels were not opened. After a while a single injection of olive oil will cause a daily action for several successive days.

(e) *Electrical applications* which are given for the relief of pain and spasm can undoubtedly exercise a beneficial influence upon the colon and so supply a specific remedy for colitis. But the costliness of the apparatus, the prolonged duration of the treatment required, and the absence of permanence of the results, militate against its general or even its frequent use in routine practice. If, however, the apparatus is at hand and the medical attendant happens to have had exceptional experience in medical electricity, there can be no objection to the extended use of electricity for this purpose.

Electricity finds its most profitable employment in colitis complicated with ulceration, excellent results having been obtained by ionisation.

(f) *Vaccine Therapy* is not found of very great application in the ordinary cases of chronic colitis associated with constipation. Its use is more encouraging in cases in which looseness of the bowels is a feature. In our own practice we have not been accustomed to regard its application as indicated except when an inveterate colitis of some years' duration has failed to yield to any other means of treatment, and in a few such cases we have certainly found pronounced improvement to result from a course of autogenous vaccination.

Matthews¹ points out that an objection to complete bacteriological investigation of any one

¹ Matthews, *Transactions of the Medical Society of London*, vol. xxxii.

case is that such an enormous number of organisms have to be identified involving so great a labour that it can hardly be completed in the patient's lifetime. He has found the coliform bacilli to be the most pathogenic, and out of thirty-five cases treated, seventeen showed improvement, some of which

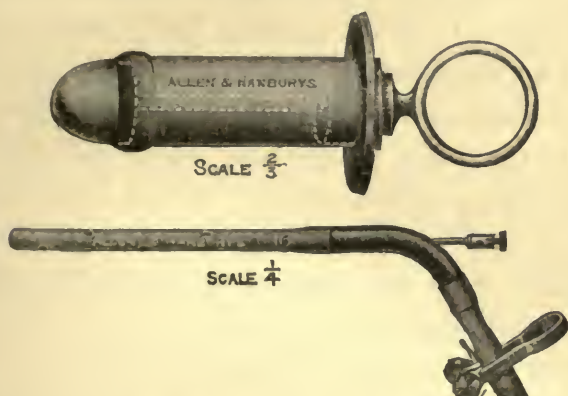


FIG. 4.—DR. HERSCHELL'S ELECTRODE FOR THE INTESTINE.

This consists essentially of a perforated rubber tube containing a metallic spiral wire which projects from the proximal part of the apparatus and ends in a screw connection. The tube when in use is covered with an envelope of animal membrane and introduced in a collapsed form into the rectum. The desired electrolyte is then pumped in and retained by a clip. To facilitate introduction of a lax membranous bag through the sphincter a speculum is first introduced, through which the electrode is subsequently passed. The latter instrument is now made straight so that the speculum can be withdrawn over it after introduction.

were probably absolutely cured. His method is to identify the organisms and put them up to the patient's blood, selecting as the pathogenic ones any which show a big variation to the opsonic index, verifying by the occurrence or not of a reaction as in the tuberculin test.

The following are the vaccines he has utilised :¹

18 of the *Bacillus Acidi lactici* of Hüpper.

8 of Friedländer's bacillus.

11 of the *Bacillus Coli Communis*.

4 of a *Streptococcus* (all these were useless).

1 of *B. Paratyphosus* (a very good result was obtained).

In obtaining fæces to submit to the bacteriologist, a glass tube, to which a rubber bulb is attached, is passed up the intestine as high as possible (through a sigmoidoscope). The tube when withdrawn is placed in a sterile outer tube, sealed, and sent to the laboratory without delay. It may, however, be added that different bacteriologists are prejudiced as regards both the method of obtaining and of transmitting the stools, and it is well therefore to ascertain their views in any particular case.

(g) *Treatment by Drugs administered by the Mouth.*—The drugs by means of which we can exert specific action upon the intestinal mucosa and the production of mucus are :

(1.) Astringents.

(2.) Bile salts.

1. *Astringents.*—With these drugs we can certainly exert an action upon the intestines, and they are indicated in many cases when the stools are loose. Formerly we had at our disposal only astringent drugs like tannin, which, when given by the mouth as such, not only exerted an undesirable

¹ *Loc cit.*

astringent effect upon the stomach wall itself, but never reached the large intestine in an active condition but were absorbed or agglutinated in the upper part of the small intestine. Modern pharmacy has provided preparations such as tannigen, tannalbumin, tannocol, tannoform, which in the form of insoluble powders pass through the stomach unchanged and in the intestines are split up and liberate the astringent portion to act locally on the intestinal mucosa.

It will often happen in practice that after we have removed the irritation caused by the products of intestinal indigestion by curing the indigestion, a very short course of some of these astringents will be all that is required to reduce the daily number of stools to the normal.

2. *Bile Salts*.—As we have already mentioned (p. 13), it is now pretty well established that the mucus passed by patients with chronic colitis is in many cases due to a preponderating action of the mucinase in the intestine, and thus presumably to a deficiency in the biliary secretion. Common sense would suggest that if we could restore the biliary secretion to a normal condition the mucus would largely disappear and a favourable effect would be exerted upon the intestinal mucosa. Of all the agents with which we are able to stimulate the secretion of bile it is universally agreed that the most efficacious is the bile itself.

This fact was known to our ancestors, who freely used inspissated bile in pill form. Unfortunately the knowledge seems to have been lost in spite of the teachings of such pharmacologists as Professor Dixon, who says, "There is only one cholagogue worthy of the name, and that is bile salts,"¹ for bile is now very rarely prescribed and probably never by the young scientific physician of the present generation. More recently this therapeutic measure has been revived and we have been provided by the pharmacist with quite a number of bile preparations.

It has been well established clinically, that by the administration of a suitable preparation of bile we can directly influence the amount of mucus excreted. In all cases in which mucus is in great excess, an alcoholic extract of bile should be prescribed as a matter of routine.

Incidentally there is usually in these cases another indication for treatment. On a microscopical examination of the stools there is often found evidence of imperfect pancreatic digestion in the shape of undigested muscle fibre and untransformed starch. We must therefore prescribe secretin, the exciter of the pancreatic secretion, and enterokinase to activate or "sensibilise" the pancreatic juice when secreted. We can give both

¹ Dixon, "Facts and Fancies in Pharmacology," *British Medical Journal*, 1909, vol. ii. p. 540.

these substances by exhibiting an extract of the duodenal mucous membrane of which there are several on the market. It is also possible to obtain a preparation of French manufacture in the form of large pills containing in each a little over 3 grains of alcoholic extract of ox gall and $\frac{1}{10}$ th of a grain each of active secretin and enterokinase, the whole well coated with keratin so that it will pass into the intestine before solution takes place, thus insuring that it shall be available at the spot where its presence is required, namely the point of absorption.

G. GENERAL HYGIENE

Colitis demands no specific climate for its cure : either dry or humid air, sea or country, hill or valley is alike immaterial, provided that conditions are present where a pleasant temperature obtains and good hygienic measures with the possibility of moderate exercise can be assured.

Combe is prejudiced against the sea air and also against a very warm climate, which he says tends to increase intestinal putrefaction. The best of all he thinks is mountain air, but the High Alps must be avoided and altitudes of 1200–2500 ft. in the winter and 2500–5000 ft. in the summer he regards as the maxima.

Rest to the body and to the mind will sum up

practically all that need be said regarding the general treatment—simple advice, easy to pronounce but, as probably not one reader will fail to admit, phenomenally difficult to procure.

If it is possible to persuade the patient that others suffer as badly as he does, not a little progress will have been made. If he can be further convinced that he has no dreadful incurable malady but only one requiring a long patient treatment in which inevitably ups and downs are encountered, the battle is all but won. And if, finally, he can be induced to have confidence in himself and to realise that all that is necessary is to train his intestine, a cure may with absolute confidence be expected.

The close relation between colitis and disturbance of the nervous system has already been sufficiently emphasised. It is in this connection difficult to dissociate cause and effect, but it is clearly evident that a vicious circle is very easily established, and that to institute a frame of mind and a bodily condition to which the term tranquillity can be legitimately applied will be to have proceeded a long way on the road of successful treatment.

Combe suggests raising the blood pressure by intestinal lavage and hypodermoclysis, and stimulating the nervous system by lecithin. He also recommends in such cases cacodylate of soda, carefully

administered on account of the colitis, to improve the appetite. In our own practice, to avoid irritating the intestinal tract we administer all tonics such as iron, glycerophosphates, cacodylate of soda, by hypodermic injection. As a general rule with respect to so-called tonics, they are very seldom really needed in the treatment of colitis as the patient invariably puts on weight and strength as soon as the colitis begins to improve. Above all things the physician must be on his guard not to try and combat every symptom of which the patient complains by the administration of some drug. This is the worst and most unscientific kind of treatment. It will readily be believed that there is scope for considerable ingenuity on the physician's part to interpret every one of the protean symptoms that will inevitably be presented for his explanation, and as most of them are reflex or due to autotoxins, their direct treatment is impossible.

An essential feature of all régimes is regularity. Rising, meal times, and going to bed must be regarded as a ritual to be faithfully observed. Violent exercise is forbidden. Short walks at a moderate pace, a round of golf, a little fencing will all be beneficial. Cycling too is a particularly good exercise, but the greatest care must be taken to avoid fatigue, and it should not be indulged in unless the rider lives in the country and is able to

avoid traffic riding, the mental strain of which is most injurious to all neurasthenics. Horse riding will be found too violent unless the patient is a good rider and has horses with comparatively little action. It is as well to forbid exercise in any form to women at their menstrual periods. Patients with colitis are almost invariably subjects of bad circulation, and they are in consequence particularly sensitive to cold and affected by it. A word of warning to the patient to be warmly clad is indeed a word to the wise.

It may seem that such injunctions, which after all comprise only the life of a careful healthy man carried out with greater minuteness and attention to detail, are unnecessarily insisted upon as they are perfectly obvious and almost universally known. Yet a considerable number of patients with colitis can be convicted of having violated practically every hygienic law either through ignorance or wilful neglect. So that an emphatic insistence upon an immediate and complete return to the path of physiological righteousness, as the late Sir Andrew Clark used to say, from the mouth of a man whose words carry conviction will do much to render probable a complete cure of one of the most obstinate chronic diseases a medical man encounters.

PROGNOSIS

A word as to the patient's prospect of getting well. This very much depends upon the patient himself and the facilities which he will give the physician for carrying out the treatment.

There should invariably be first of all a period of three or four weeks in bed during which time appropriate local applications such as irrigation may be made to the mucosa of the intestine, the regularity of the stools established, and the improvement in diet carried to a convenient stage.

It is then absolutely necessary that the patient should report himself at regular intervals for changes in the treatment. Very often the patient finds that he is improving and in consequence neglects to come, but continues the particular stage of treatment far longer than is advisable. The mere fact of being better should be an encouragement to come to the physician. The cure of a disease is like going up a ladder, you go up a step at a time. As soon as improvement shows itself the question arises whether any modification can be made in the treatment which will expedite the cure. Neglect to do this often leads to the patient remaining at the same stage and ceasing to improve.

After getting up from the initial period in bed

the patient should at first report himself once a week, bringing a sample of his stools for examination. The interval between the reports is then gradually increased until the patient comes only once a month, which he should continue to do until he has reached normal diet and has been upon it for a couple of months at least.

No scheme of treatment for such a complicated disease as chronic colitis can be carried out by the patient without skilled supervision, as it is impossible to give him such a comprehensive list of instructions as will meet every condition which may arise.

H. APPLICATION OF THE PRINCIPLES OF TREATMENT TO SPECIFIC CASES

We have now considered in detail the methods of treatment at the disposal of the practitioner, and it only remains for him to adapt them to the particular case which he has in hand.

Having supplied him with a large and varied arsenal of weapons, we must leave to his judgment the selection of the method or methods which are most likely to give good results in the particular case which he is about to treat. In all cases we advise an attempt to apply in order the several indications for treatment which form

the headings of the sections in the part of the book devoted to treatment.

To recapitulate at the risk of becoming tedious, we must again strongly impress upon the reader that system is everything in the treatment of such a complicated affection as chronic colitis. Without system, any treatment must be chaotic and tend to degenerate into a hopeless attempt to ameliorate symptoms, and failure will be practically certain.

On the other hand, we feel that we can assist the diligent student of this book by giving him a few very brief hints as to the management of the commoner cases met with in practice.

Chronic Colitis without Special Symptoms.—The student will have made a proper diagnosis and have established the fact that there really is chronic colitis (p. 89). He will have excluded any gross lesion in the lower bowel such as a growth, and may perhaps have been fortunate enough to have determined the absolute cause of the colitis.

He will begin treatment by persuading the patient to go to bed for a few days. With the patient confined to bed a great deal of treatment otherwise impossible may be undertaken, quite apart from which there is hardly a case of colitis in any stage that will not benefit from the rest and warmth. Unfortunately, the physician will

probably find it by far the most difficult part of the treatment to persuade the patient to go to bed and be nursed. It is an example of the strange perversity of human nature that whilst a patient will stoutly profess his willingness to do or suffer anything to get cured, he will advance insuperable obstacles as soon as he is advised to go to bed, a simple inconvenience surely to improve a condition that has lasted for years, is rendering life a misery, and is threatening to induce chronic invalidism.

In ordinary uncomplicated chronic colitis of any severity what you gain by putting the patient to bed are the following tangible benefits:—

(a) You are enabled to commence a course of irrigation or other local treatment with the certainty that the proper technique is used, and with the advantage that the effects can be noted. In this way you may ascertain the best dose, duration, and frequency of the treatment for that particular case, and if it has to be continued after the patient has resumed his normal occupations he will have been taught the correct method of applying it and will experience no difficulty when he is left to his own resources.

(b) The special diet may be commenced. A daily microscopical examination of the stools enables the physician to ascertain whether the different articles are digested and are tolerated by

the intestine and so to make any necessary modifications. This is most important at the commencement of the treatment, as it is not then, as it is later, merely a question of ascertaining whether a new food added to the diet list is digested but to do this for everything which is contained in the daily menu—a far more complex matter.

(c) Among the minor advantages will be that if by any chance pyorrhœa is a factor in the production of the affection, the patient will have plenty of time and an ideal opportunity to apply the necessary local treatment.

(d) It is possible to ascertain the exact method which gives the best results in this particular case in procuring a daily action of the bowels.

Of course it is unnecessary to point out that in very early or mild cases which do not require local treatment all this is not essential; the patient can very well be treated without going to bed provided that he will attend regularly in order that the effect of the treatment may be sufficiently watched. It is important to emphasise upon the patient the necessity for regular attendance, because it almost invariably happens that as soon as he commences to improve he will neglect to come, often breaking or cancelling his appointment. He gives as his reason for not coming that he was getting better and he returns only

when the improvement has ceased and he is worse again.

The fact of improvement having taken place so far from indicating that a consultation is unnecessary, really points out the reverse. Cure in chronic colitis is obtained by gradually educating the intestines to tolerate foods which have hitherto disagreed, and naturally the proper time to make an improvement in the diet and try the effect of an addition to the menu is when the patient is better—not when he is worse. If the patient postpones his visit until the stage of improvement has passed off he has thrown away his opportunity of making a step upwards, and if he habitually does so he can never expect to be really and permanently cured.

The patient then being in bed the practitioner will proceed as follows in order to make the best use of the short time at his disposal:—

1. *Diet.*—The patient will be placed upon the diet which is theoretically indicated by the stage and severity of the disease, a teaspoonful of powdered vegetable charcoal or two or three of Belloc's pastilles being given with the first meal. As soon as the stools are coloured black it may be assumed that the fæces already in the intestine before the patient commenced his diet have been evacuated and that all subsequent stools will be the result of the test diet. From this date the

daily stool will be examined macroscopically in a Petri dish by transmitted light, preferably on a Koenig's table, and microscopically in the usual manner. Any article of food which appears in the stools in abnormal quantity or in an undigested condition, will be according to circumstances, eliminated, reduced in amount, or administered in a more finely comminuted condition. In addition, the digestive ferments implicated will be reinforced whenever considered necessary by the administration either of pepsin or pancreatin, or, according to the more modern system, of duodenal extract, secretin, kinase, &c. In cases in which the diet is evidently suitable, the amount of each food may be increased until it has been ascertained how much the patient's digestive organs are capable of dealing with, or, if preferred, the opportunity may be taken of extending the diet by the addition of more articles. The result to be aimed at in every case is that the patient should leave the home with the most liberal diet which the stage of his affection and the condition of his digestive apparatus will permit.

2. *Bowels*.—The next consideration is to secure a daily action of the bowels, and for this alone it would be worth while to go to bed for a few days. The first point to be attended to is to make sure that there is no retained faecal

matter in the intestines, and with this object an oil enema should be given and retained all night in the manner already set forth (*vide* p. 244). The administration of agar or paraffin preparations is then commenced with adjustment of the dose until the minimum which is effective is determined. If oil or water injections are to be used, one will have ascertained their frequency and the necessary quantity by the time the patient leaves the home.

3. *Local Treatment to the Intestines.*—In this connection it must be decided whether it is advisable to make any direct applications to the interior of the bowel such as injection of carbonic acid gas, nebulæ, hydro-electric douches, or irrigations with radium water or with the different media at our disposal. If we decide on one of these methods of treatment, we commence it and carefully observe, modifying as circumstances dictate until it is producing the best results of which it is capable. If it is a method of treatment which will have to be continued in the future by the patient, he is thoroughly instructed in the manner of applying it.

4. The patient will probably be anæmic or present some other indication for drug therapy, and advantage should be taken of his presence under observation to give him a course of treatment by intramuscular injection which is by far the

best method of administering tonics to patients with chronic colitis since the stomach is not upset. In cases of anæmia a blood count will, of course, first be taken and the dose and frequency of the injection determined from time to time by the effect upon the hæmoglobin and red corpuscles. All injections should be isotonic with the serum of the blood; 1 c.c. will be found a very suitable capacity. The following are favourite formulæ of ours, and should be put up in ampoules each holding one dose:—

R

Ferri Cacodylatis	0·03 gm.
Sodii Glycero-phosphatis	0·10 gm.
Strychninæ Cacodylatis	$\frac{1}{2}$ mill.
Aq. ad	1 c.c.

R

Strychninæ Cacodylatis	$\frac{1}{2}$ mill.
Sodii Glycero-phosphatis	10 centigrammes
Aq. ad	1 c.c.

Such is an example of the method which would be followed in elaborating a scheme of treatment for a given case which does not present any special features.

When the case is of a more complicated nature modifications of this treatment may be required.

The chief condition which requires study in this connection is permanent looseness of the bowels.

It must be assumed that the practitioner has

ascertained in the process of diagnosis whether this looseness is due to (a) hypersecretion of mucus, (b) involvement of the small intestines, (c) ulceration (*vide* p. 31), as the treatment will depend entirely upon the condition present.

Hypersecretion of Mucus.—When there is hypersecretion of mucus, or more probably deficiency of mucinase, the absence of any inflammatory condition having been ascertained by the lost albumin test (*vide* p. 94), we shall naturally administer bile salts in conjunction with enterokinase in capsules keratin coated so that they will be able to pass through the stomach unchanged. At the same time we may with advantage order one of the astringent drugs with a basis of tannin (*vide* p. 250).

Involvement of the Small Intestine.—Practically the same treatment will be required when the looseness of the stools depends upon involvement of the small intestine, as in these cases the morbid changes in the mucosa must interfere with the production and utilisation of the pancreatic hormones.

Cases complicated with Ulceration.—It is quite different, however, when there is ulceration of the bowel; in these circumstances irrigation of the bowel will be one of our most valuable methods of treatment, and it is of the greatest

importance that it should at any rate be commenced under the best auspices and the effect of the different irrigation fluids ascertained before the method is given into the patient's own hands to do at home. The question of vaccines must also receive careful consideration, and the bacteriology of the stools carefully investigated in order to ascertain whether there is any organism which possibly bears a causal relationship to the phenomena of the case, and from which a vaccine may legitimately be made.

Acute Attacks occurring in the Course of Chronic Colitis.—The treatment of all except muco-membranous colic is essentially the same.

The complication most frequently met with in chronic colitis and described under the name “*crise glaireuse aigue*” by Combe and others, has been discussed on p. 42. Its treatment will comprise:—

1. Absolute rest in bed.
2. Application of moist warmth to the abdomen (*vide* p. 210).
3. Reduction of the diet, at first to plain Evian water, then the introduction of thin water gruel made with *crème d'orge*, arrowroot, or rice; absolute prohibition of milk and beef tea and animal soups.
4. Disinfection of the bowel (*vide* p. 214).

5. Opium, if necessary, to relieve pain.

Later on, when the acuteness of the attack has passed off, the thorough irrigation of the bowel to wash away all irritating substances and the administration of astringents with a basis of tannin.

The treatment of those acute exacerbations which have been described as dysenteric and pseudo-typhoidal attacks is essentially the same, with the exception that in the former we may administer by the mouth keratin-coated tabloids of emetin hydrochloride with which exceedingly good results have sometimes been obtained.

Attacks of Muco-membranous Colic.—These attacks require treatment of quite a different nature. One has to remember that the immediate cause of the attack is the accumulation of consolidated membranes in the form of shreds and sheets in the intestines, and that the attack is virtually the result of the attempt of Nature to effect their expulsion. The rationale of treatment, therefore, will be to assist the efforts of Nature and minimise the ill effects produced. The treatment during an attack of muco-membranous colitis will comprise :—

1. Absolute rest in bed.

2. Relief of spasm and pain. This is absolutely the first indication. A hypodermic in-

jection of morphia and belladonna should be given at once.

3. Removal of the irritating substances from the abdomen.

A large warm olive oil enema should be given with the technique already described (*vide* p. 244). We actually introduce about 10 oz. of olive oil, and then, without removing the tube, pour in a pint of warm water containing a teaspoonful of essence of peppermint and send it up after the oil.

The enema should be given very slowly, the patient being in the left lateral position, and after he has received it he should assume the knee-shoulder position for ten minutes. Two hours afterwards, an enema should be given of a couple of pints of water, at 99° Fahr., containing a saltspoonful of pure oleate of sodium. This will generally bring away large quantities of muco-membranes.

4. *Diet.*—The patient should be reduced at once to water gruel made from crème d'orge, crème de riz, arrowroot, or other suitable farina, and kept on this for at least two days. We may then gradually add rusks, breakfast biscuits, boiled eggs, nouilles, until we reach again the normal diet which the patient was having when the attack began.

The subsequent treatment will be that of ordinary chronic colitis, as set forth in the chapters on treatment.

In this type of case, injections of olive oil are of the first importance.

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